



Protocol paper

Risk factors for functional decline in a population aged 75 years and older without total dependence: A one-year follow-up



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ARTICLE INFO

Article history:

Received 30 December 2014

Received in revised form 2 March 2016

Accepted 3 April 2016

Available online 4 April 2016

Keywords:

Aged

Aged 80 and over

Activities of daily living

Disability

Cohort study

ABSTRACT

Objectives: estimation of functional loss incidence and identification of risk factors associated with new disability onset in people aged 75 and older without severe dependence in a rural primary care setting. **Patients and method:** Prospective cohort study of a representative sample of people aged 75 years or older without severe dependence (Barthel Index > 20 and Lawton Index > 1) at a primary care center, with a 12-month follow-up. The baseline geriatric assessment recorded activities of daily living (ADL), sociodemographic information, numbers of drugs prescribed, previous hospital admissions and falls, cognitive function, hearing and visual capacity, body mass index, blood pressure, and the Short Physical Performance Battery to evaluate lower limb function. ADL was re-assessed after 12 months, defining functional loss as a fall of ≥ 10 points on the Barthel Index and/or ≥ 2 instrumental activities of the Lawton Index. Bivariate and multivariate analyses using logistic regression models were conducted to identify factors independently associated with functional loss.

Results: Mean age was 81.7 years, 58.7% of patients were men, and 23.4% presented functional loss at the 12-month follow-up. Variables identified as independent predictors of functional loss were hospital admissions (aOR 3.92; 95%CI: 1.35–11.39), cognitive impairment (aOR 2.60; 95%CI: 1.39–4.92) and lower limbs functional limitation (aOR 2.01; 95%CI: 1.02–3.97).

Conclusions: Our results support the use of performance batteries in primary care for identifying elderly persons at risk of functional decline; and they also highlight the relevance of appropriate management of hospital admissions and planned discharges in order to preserve patients' functional status.

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1. Introduction

European countries present an increasing ageing population. In early 2010, the amount of people over-65 years old was a quarter of those at working age (15–64 years). Spain is among the countries with the highest life expectancies in Europe (GHO, 2014). Over the past decade, life expectancy at age 65 has increased among both

women (from 21.0 to 22.7 years) and men (from 16.9 to 18.5 years) (EHLEIS, 2013). Estimates for 2021 indicate that the over-65 will equal 30% of individuals at working age in Spain, and that one in three of those will be aged 80 or more (IMSERSO, 2004).

Functional decline has been broadly defined as the loss of ability to independently carry out activities of daily living (ADL) (Covinsky, Justice, Rosenthal, Palmer, & Landefeld, 1997). In developed societies, around 20% of people aged 70 years or older, and 50% aged 85 and older present disabilities in basic ADL (Heikkien, 2003). The annual rate of new disability in people aged 75 and older is estimated around 12% (Hebert, Brayne, & Spiegelhalter, 1997). The increase in disability and dependence

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is not only explained by the inversion of the population pyramid, but also by other factors that are modifiable, and therefore target of intervention. The modifiable risk factors associated with new disability described in the literature are (Beaton, McEvoy, & Grimmer, 2015; Stuck et al., 1999; Tas, Verhagen, Bierma-Zeinstra, Odding, & Koes, 2007; Vermeulen, Neyens, van Rossum, Spreeuwenberg, & de Witte, 2011): prior functional status measured by ADL, functional limitation of the lower limbs, loss of upper body strength, cognitive impairment, depression, comorbidity, polypharmacy, thinness/emaciation or obesity, reduced social contact, physical inactivity and visual impairment.

Epidemiological studies in the elderly, traditionally focused on severe disability, changed the focus to healthy ageing towards the end of the last century, now studying samples of relatively healthy, independent older people (Berkman et al., 1993; Fried et al., 2001; Rockwood et al., 2005). These studies suppose an attempt to identify the subgroup of elderly people who maintain an unstable independence and who are in risk of functional loss. Investing efforts in health promotion to avoid disability continues being relevant at these ages, considering that people with good functional status at age 70 have higher longevity with better health, without generating higher healthcare costs (Lubitz, Cai, Kramarow, & Lentzner, 2003).

Frail older people have an increased risk for adverse health outcomes, such as disability, hospitalization, institutionalization and mortality (Ferrucci et al., 2004). Frailty has been defined as a geriatric syndrome characterized by a relevant reduction of physiologic reserves increasing the person's vulnerability to endogenous and exogenous stressors, an reducing the person's ability to maintain a homeostatic balance (Morley et al., 2013). Nowadays, despite the consensus on the definition of frailty, it is still not clear how to operationalize it. Two approaches predominate: either using complex multidimensional indices based on accumulated health deficits, as in two Canadian studies with 36 (Song, Mitnitski, & Rockwood, 2010) and 70 variables (Rockwood et al., 2005); or the frailty phenotype proposed by Fried et al. (2001) based on five criteria (walking speed, grip strength, self-reported activity levels, exhaustion and unintended weight loss). But even this latest 5-criteria approach presented difficulties in clinical practice as the hand grip strength is not frequently assessed.

Primary care is the most appropriate setting to detect and take care of frailty. However, the identification of the frailty syndrome is still too complex to be considered clinically friendly (Lacas & Rockwood, 2012; Rouge Bugat, Cestac, Oustric, Vellas, & Nourhashemi, 2012). Few measures have been validated in a primary healthcare setting, and not many studies recruit patients directly in primary care consultations (Pialoux, Goyard, & Lesourd, 2012). General practitioners need easy tools to identify frailty. The identification of modifiable risk factors of functional loss would provide frailty markers for the clinical setting and may help to define strategies to delay the onset and progression of disability.

The aim of the present study was to estimate the incidence of functional loss and to identify the risk factors associated with the onset of new disability in people aged 75 and over without severe dependence in a rural primary care setting.

2. Material and methods

2.1. Design

Prospective cohort study of a representative sample of people aged 75 years or older without severe dependence treated at the Primary Care Center El Remei (Vic, province of Barcelona, Spain), with a follow-up of 12 months. Inclusion criteria were Barthel index > 20 and Lawton-Brody index > 1. Exclusion criteria were:

participation in any homecare assistance program, terminal illness with prognosis of less than six months of life, presence of a severe problem in the days prior to the assessment, temporary residence in the area, or language difficulties for communication. The sample was obtained among the 1017 individuals aged 75 years or over treated at the primary care center. Two strata, people between 75 and 84 years old ($n=830$) and people aged 85 years or older ($n=187$) were considered. The number of subjects in each age stratum was proportional to the size of the stratum in the reference population. For each stratum, the sample was obtained by a random selection.

The project was approved by an independent Ethical Committee of Clinical Research.

2.2. Sample size

The estimated sample size for an annual incidence of disability of 10%, with a confidence level of 95% and a precision of $\pm 3\%$, was 279 individuals. Assuming a participation of 80% of which 15% would present exclusion criteria and 10% lost to follow-up, a total recruitment of 504 subjects was planned.

From the sample of 504 randomly selected individuals, 84 presented exclusion criteria, 59 could not be located, and 26 subjects were replaced. Of the 387 people invited to participate in the study, 315 agreed and completed the baseline assessment. The cohort recruitment process and baseline characteristics have been described in detail previously (Arnau et al., 2012).

2.3. Geriatric assessment

Physicians and nurses with geriatric assessment experience evaluated participants at the primary care center or at home (if the subject had mobility problems). Training sessions were conducted in order to standardize criteria and to reduce interobserver variability.

The baseline assessment questionnaire collected information on age, sex, educational level, marital status, living facilities (i.e., number of people in the household), informal and formal home help, number of drugs prescribed, number of previous hospital admissions, and falls in the six months prior to the evaluation. Self-perceived health was assessed with the question "Would you say that in general your health is: excellent, very good, good, fair or poor?".

The General Practitioner assessment of COGnition (GPCOG) (Brodsky et al., 2002) instrument was used to assess cognitive function. It is composed of a cognitive and a functional section. The first has nine questions for the patient to answer (such as time orientation, delayed recall of a name, awareness of a current event and clock drawing test), takes less than four minutes to administer, and has a maximum score of 9. The second, with six primary caregiver-reported items, assesses amnesic and speech difficulties, and functionality (medication preparation, money management and use of public transport). It takes less than two minutes to administer, and the maximum score is 6. The GPCOG is administered sequentially. A score of 9 on the first section indicates that there is no cognitive impairment; while scores of 4 or less make cognitive impairment strongly suspected. In these two cases, the informant interview is deemed unnecessary, but otherwise the second section is administered, and cognitive impairment is suspected when the caregiver's score is 3 or less.

Five instrumental ADL were assessed with the Lawton-Brody Index (ability to use the phone, money, transport, shopping and responsibility for medication) obtaining an overall score ranging from 0 to 5. The Barthel Index, whose total score ranges between 0 and 100, was used to assess basic ADL. For both indices, 0 indicates maximum dependence and higher scores greater independence.

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