

## Short Report

# The epidemiology of domestic injurious falls in a community dwelling elderly population: an outgrowing economic burden

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In Italy, more than 3 million people annually sustain a domestic injury; the elderly experience it the most. From a healthcare perspective, elderly falls are a major clinical issue with an outgrowing socioeconomic burden. The aim of the study was to evaluate the epidemiology of injurious falls in a community dwelling population, admitted to the emergency room (ER) because of a domestic injury, to assess the socioeconomic burden. Seventy-four hospitalized patients among 227 were examined. Falls represented the main cause of admittance to the ER; the average cost for fall-related hospitalization was of €5479.09.

**Keywords:** falls, elderly, health expenditure, frailty.

## Introduction

In Italy, more than 3–4 million people annually sustain a domestic injury; the elderly people experience it the most with important consequences in term of disability, hospitalization and overall mortality.<sup>1</sup>

Among the domestic injuries, falls represent the most prevalent event: one-third of the people >65 years of age sustain at least one injurious fall every year; the incidence rate is three times among nursing home residents (1.5 fall/bed/year).<sup>2</sup> The fall incident rate is positively correlated with age, with a maximum peak in subjects >80 years of age.

The unintentional domestic injury represents the sixth leading cause of death in the elderly.<sup>1</sup> Several studies<sup>3–5</sup> showed a positive correlation between the risk of falling and the number of risk factors. Tinetti demonstrated that the risk of falling is 8% in subjects without risk factors, increasing to 78% in subjects with four or more risk factors.<sup>5</sup>

The direct complications of falls range from soft tissue traumas to fatal accidents. Hip fracture represents the most frequent injurious fall complication associated with increased disability (only 33% of subjects regained the pre-existing functional independence) and increased mortality rate (33% died after one year).<sup>6</sup>

From a healthcare perspective, elderly falls are a major clinical issue in term of frequency, disability, institutionalization and overall mortality, with an outgrowing socioeconomic burden.<sup>6,7</sup>

Recent surveys have estimated a huge expenditure for direct medical cost (in the USA, more than US \$19 billion for non-fatal falls in subjects >65 years of age; in the UK, US \$1.9 billion for emergency services and hospitalization, while an

Australian study reported a national healthcare cost for elderly falls of US \$66.1 million). Interestingly, two-thirds of the overall medical costs are due to falls requiring hospitalization.<sup>7</sup>

In Italy, the cost of a domestic fall hospitalization is €395 million per year. According to the Informative National System for Injuries in Domestic Environment (SINIACA) database, the average cost for hospitalization in Italy is estimated to be about €3000.<sup>6</sup>

The aim of our study was to evaluate the epidemiology of injurious falls in a sample of elderly population dwelling in a community and to analyse the cost of hospitalization in order to assess the real socioeconomic burden and to draw a risk profiling of the elderly falling in our country.

## Methods

In one trimester period, 227 subjects >75 years of age were admitted to the emergency room (ER) because of a domestic injury from June through October 2006. Seventy-four (32.6%) of the 227 subjects were hospitalized and their data were examined.

Records of clinical data and the severity medical rating scale of admittance for each hospitalized patient were collected from the hospital informative database (PIESSE CIBIM, Pavia, Italy). SINIACA database provided the data on the dynamics of the domestic injury, the clinical records and the diagnosis (DRG on the hospital discharge schedule).

Data were reported as mean ± standard error. The data were analysed with STATA/SE<sup>TM</sup> software (StataCorp LP, College Station, TX, USA).

The statistical analysis was done using non-parametric chi-square test to evaluate the difference between the two groups by the Kaplan–Meier method for the survival analysis and by COX proportional hazard model to assess the role of possible confounders

A *P*-value <5% was considered significant.

## Results

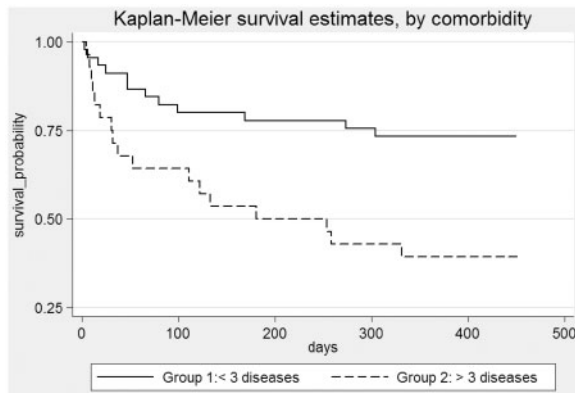
In our study, falls represented the main cause of admittance to the ER (62.60%) among all domestic injuries. There were 74 elderly (32.60%) who sustained an injurious fall that

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**Figure 1** Mortality rate estimates between Group 1 (less than three diseases) and Group 2 (more than three diseases).

required hospitalization, with a mean age of  $86 \pm 6$  years; there were more women represented in this group [female (age  $86.38 \pm 6.00$ , median 86), 78.34% vs. male (age  $85.25 \pm 7.67$ , median 86.5), 21.66%].

The most common activity within the fall event was walking (51.35%), while other usual activities as doing housework had a lower prevalence (8.11%).

The present study showed that the elderly in community dwellings are the most prevalent fall sustaining group (87.84%), while the elderly in nursing homes represented only 12.16%.

The fall subjects were affected by a high mean comorbidity status ( $3 \pm 1$  concomitant diseases) with a mean polypharmacy of  $4 \pm 2$  drugs. The 12-month overall mortality was 33.72% (of which 52.38% in nursing home). The high comorbidity subject group resulted in a significantly higher mortality rate compared with healthy subjects (i.e. having less than three diseases), as shown in figure 1 (60.71 vs. 26.67%,  $\chi^2 = 8.81$ ,  $P < 0.01$ ). A Cox proportional hazard model analysis was performed in order to assess the role of age variable on the two mortality curves: matching for the same age, the group with lower comorbidity showed a statistically significant decrease of the mortality hazard.

Hip fracture was the most frequent fall-related complication (64.29%) of hospitalized patients followed by fracture of the forearm (11.27%), head (12.68%), pelvis (12.68%) and chest (8.45%).

Analysis of DRG of the hospital discharge schedules showed an average cost of €5479.09 for fall-related hospitalization, which was higher than what was reported in the SINIACA study (about €3000).<sup>6</sup>

In the 3-month observational period, the overall medical cost was €405 452.56 for the 74 hospitalized patients evaluated, and this may be converted to an annual direct cost of €1 621 810.21, for this single hospital.

## Discussion

In Europe, falls are considered a major medical and socio-economic burden, representing on average, 53% of the domestic injuries.<sup>8</sup> Our small study provided further confirmation of this epidemiological trend addressing falls as the most prevalent cause ( $\approx 63\%$ ) of domestic injured elderly entering the ER.

Interestingly, the patient clinical characteristics in the study met the criteria of the frail elderly phenotype. The fallen hospitalized patients had advanced age, high comorbidity status with high polypharmacy so they might be addressed to the frail phenotype. Frailty, as a genuine geriatric

syndrome, is known to be correlated with adverse health outcomes and higher mortality. Therefore, the positive correlation between the fractured patients and the high mortality rate in our sample population, is in accordance with the literature data.<sup>1,6</sup>

Our data highlighted the higher mortality rate in the elderly after 12 months observational period; compared with the younger subjects who were evaluated in studies recently reported in the literature;<sup>6</sup> however, if the result of the present study is matched with the same age range, the numbers would be similar.

The higher cost of hospitalization compared with data from previous studies<sup>6,7</sup> may be explained by the complexity and comorbidity of the patients in the present study.

Eventually, the following issues should be considered: a mandatory multidimensional geriatric assessment should be routinely performed in ER-admitted elderly in order to explore functional, motion, cognitive and socio-affective domains, to properly stratify the individual's frail risk profiling, to provide the adequate preventive interventions, and to reduce the fall-related clinical burden.<sup>6</sup>

Promoting a campaign for fall prevention in the elderly is necessary, however, such a step turns out to be elusive and a difficult issue because some multifactorial fall-prevention studies recently reported this strategy was ineffective.<sup>9</sup> Recently, Tinetti<sup>10</sup> suggested in a sound and sharp editorial that geriatricians should lead an intelligent strategy to face the problem. It is feasible to tailor an individualized proven effective intervention plan to a specific sub-group, or to find 'appropriate successful tactics' to address the expected outgrowing increase of falls in the frail elderly.

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*Conflicts of interest:* None declared.

## Key points

- In this study, we analysed the cost of hospitalization in order to assess the real socio-economic burden.
- We would also draw a risk profiling of the elderly falling in our country to find 'appropriate successful tactics' to reduce the increase of falls in the frail elderly.
- This study consents to characterize the direct and concomitant causes and costs of the home injuries and to arrange a prevention plan for the elderly.

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