

A multicenter retrospective study on falls in elderly population. Epidemiology and impact on hospital workload in two Emergency Departments of Northern Italy

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Abstract

Aims of this study were to evaluate the incidence of falls in subjects aged ≥ 65 years in Parma Province (Northern Italy), and the burden of fall-related hospitalizations. All the Emergency Department (ED) visits for domestic or trivial falls were retrieved from the database of the two EDs of Parma Province during 2013. All cases were classified according to age and gender. Out of 129,898 total ED visits, 3720 (2.9%) were related to trivial falls in patients aged ≥ 65 years. Females accounted for 2648 visits and males for 1072. The absolute number of visits due to falls increased with age in both genders, with a peak between 80 and 84 yrs. When related with the actual number of residents by age groups, females showed a continuous increase, peaking at age >100 yrs, and males a continuous increase, peaking at age 95-99 yrs. Of these patients, 963 (25.9%) needed hospitalization, 605 in the orthopedic ward, 342 in medical wards, and 16 in specialist surgical units. In conclusion, falls represent a major cause of morbidity in the elderly in Northern Italy, representing 13.3% of the ED visits for people aged ≥ 65 , with a high impact on hospital workload.

Introduction

It is generally acknowledged that falls are a major public health concern, mainly affecting people aged ≥ 65 years. It has been estimated that approximately 424,000 fatal falls occur each year around the globe, which makes them the second cause of death due to accidental injury after road traffic collisions.¹ Approximately 37.3 million falls per year, although non fatal, are serious enough to seek

medical attention.¹

It has been reported that approximately 30% of community living people aged ≥ 65 years experience a fall each year, and that single and repeated falls represent an important health concern in this group.² With age advancement, many people have an increased risk of fall for a variety of reasons, including gait problems, and vision or cognitive impairment.^{3,4} According to recent European surveys, at least 20% of people aged ≥ 65 years suffers at least one fall per year.^{5,6} Up to 15% of falls in subjects living in the community² and 20% of falls in institutionalized ones⁷ result in a significant injury.

Falls are associated with several and often negative health outcomes, accounting for 40% of all injury deaths and leading to 20-30% of mild to severe injuries (from soft tissue injuries to fractures).^{8,9} A fall also carries several negative psycho-social consequences such as reduced physical activity,¹⁰ at least partially due to the fear of falling,^{11,12} and thus resulting in a global impairment of the quality of life.¹³ As such, even when non fatal in the short term, falls are often followed by functional limitations, high healthcare costs, along with medium-term high mortality.^{14,15}

In Italy, according to the Informative National System for Injuries in Domestic Environment (SINIACA) database (promoted by the Italian Public Health Institute), the average cost for fall-related hospitalization was estimated to approximately € 395 million per year in 2007.¹⁶

Surprisingly, only one study investigated the epidemiology of falls among the elderly belonging to a single study population¹⁷ and the hospital workload induced by falls in specific geographical areas.

Therefore, the main aim of this study was to evaluate the incidence rate of falls in subjects aged ≥ 65 years admitted to the Emergency Departments (EDs) of a Northern Italian Province, and their relationship with age. The secondary aim was to evaluate the burden of fall-related hospitalizations.

Materials and Methods

All the ED visits for domestic or trivial falls were retrieved from the database of the two EDs of Parma Province (about 447,000 inhabitants) during the year 2013, with exclusion of injuries related to sports, car accidents and all high-energy trauma. Since the number of visits in the two EDs was substantially stable in the last five years, and due to the high number of cases, we chose the year 2013 as representative of the trend. The University Hospital of Parma is a 1250-bed teaching general hospital, serving a population of about 340,000 inhabi-

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tants. This hospital is a level 2 Trauma Center, and a referral center for stroke and myocardial infarction. The Hospital of Vaio-Fidenza is a 240-bed community hospital, with medical wards, general surgery and orthopaedic units. The elderly population of this area in 2013 is described in Table 1. According to our study design, only patients aged ≥ 65 years were considered. All cases were then classified into groups, according to age (5-year ranges) and gender. The individual reports of the visits were analyzed separately to evaluate where and how the patient fell, the type of injury, the need for hospitalization and the ward of admission (*i.e.*, Medicine/Geriatrics, Orthopedics, Neurosurgery). We have then analyzed i) the incidence rate of falls in all subjects; ii) the incidence in relationship with age, also calculating the relative risk (RR); iii) the burden of fall-related hospitalizations in the considered age groups. The distribution of falls rate was analyzed with Pearson's χ^2 statistic, using Analyse-it (Analyse-it Software Ltd, Leeds, UK).

Due to the retrospective nature of the study and the maintenance of anonymity of all the subjects, the consensus of the ethical committee was not requested. The study was performed in accordance with the Declaration of

Helsinki, under the terms of relevant local legislation.

Results

A total number of 129,898 ED visits was recorded during 2013, of whom 92,981 in the University Hospital, and 37,007 in the Community Hospital. Males accounted for 52.1% and females for 47.9% of the whole sample. According to gross age groups, patients aged <30 years accounted for 34.4%, those aged 31-60 years for 34.85, and those aged ≥61 years for 30.75% of the total. During the same study period, 3720 ED visits were related to domestic falls in patients aged ≥65 years (*i.e.*, 2.9% of the total visits), occurring at home or in nursing-home. In the same period, 828 patients aged ≥65 years, involved in sport accidents, car accidents and high-energy trauma have been excluded. No patients were missed, due to the nature of the hospital database. As many as 2533 visits were made in the University Hospital, and 1187 in the Community Hospital. During the same period 3300 patients were visited for a fall only once, whereas 183 patients were visited twice, 15 patients three times, 1 patient four times and 1 patient five times. Accordingly, the two EDs recorded 3720 visits for 3500 patients. Overall, females accounted for 2648 visits (71.2%) and males for 1072 (28.8%), respectively (Table 2). In both females and males the absolute number of visits for falls increased with age, peaking in the 80-84 yrs age group and then progressively decreasing in older ages (Figure 1). The lowest rate of falls was observed in the 65-69 age range for both females (0.018%) and

males (0.012%).

Nevertheless, when the number of falls was related to the actual number of residents by age groups, females displayed a continuous increase [Pearson's χ^2 statistic 825; degree of freedom (DF) 8; $P < 0.001$ for trend], peaking at age >100 yrs, whereas males also displayed a continuous increase, but the peak was reached between 95 and 99 yrs, and then decreased in the group aged >100 yrs (Pearson's χ^2 statistic 716; DF 8; $P < 0.001$ for trend) (Figure 2). The RR of falls comparing the age range with the highest prevalence (>100 yrs in females and 95-99 yrs in males, respectively) with the age range exhibiting the lowest prevalence (65-69 yrs in both genders) was 6.9 (95% CI, 4.5 to 10.5; $P < 0.001$) in females and 10.4 (95% CI, 7.1 to 15.5; $P < 0.001$) in males, respectively. The age-distribution of falls was also significantly different between genders (Pearson's χ^2 statistic 43; DF 8; $P < 0.001$ for trend). This difference is probably attributable to the negli-

ble number of males in the group >100 yrs ($n=2$), which may decrease the statistical significance of our analysis. Only 6% of patients were living in nursing home, thus reflecting the social reality of Parma Province, in which traditional familiar environment is still strong enough to allow the majority of elderly people to live at home. A total number of 963 (*i.e.*, 25.9%) of patients needed to be hospitalized, 605 of whom in Orthopaedic ward due to fractures (9.9% for femur neck fractures), and 342 in Medical wards (including Geriatrics, Cardiology, and Neurology) due to non-surgical brain injury, abdominal or chest trauma, or comorbidity. Ten patients were admitted to the Neurosurgical unit for an acute subdural hematoma, two patients to Maxillo-facial Surgery for severe facial injuries, two patients to Thoracic Surgery for severe chest trauma, two to the Intensive Care Unit for multiple severe injuries.

Due to the higher prevalence of falls among

Table 1. Inhabitants aged ≥65 years of the Province of Parma, year 2013.

Age group (years)	Females		Males	
	N	%	N	%
65-69	12,623	21.7	11,580	27.1
70-74	12,964	22.3	11,101	26.0
75-79	11,141	19.2	8793	20.6
80-84	9679	16.7	6170	14.4
85-89	7369	12.7	3618	8.5
90-94	3293	5.7	1226	2.9
95-99	829	1.4	200	0.5
>100	166	0.3	30	0.1
Total	58,064	100.0	42,718	100.0

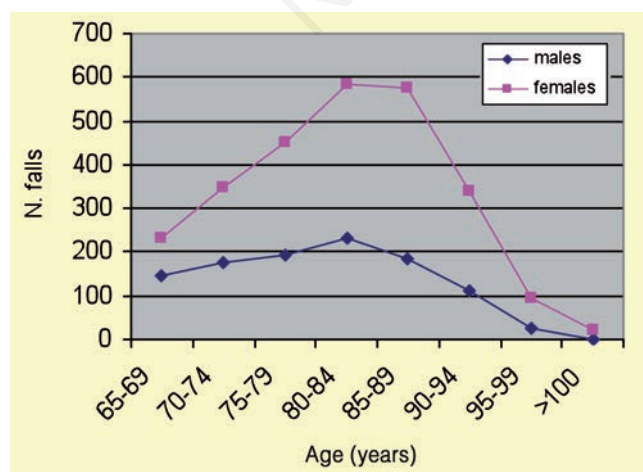


Figure 1. Absolute number of Emergency Department visits due to falls in 2013.

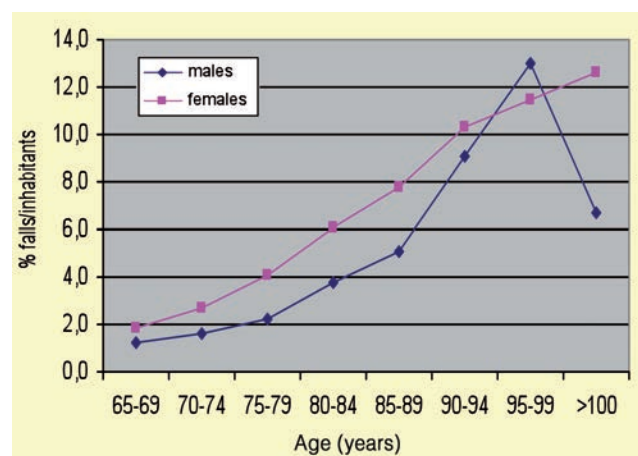


Figure 2. Number of Emergency Department visits due to falls in 2013, divided per number of inhabitants of the same age group.

Table 2. Number of old patients visited due to falls in 2013, divided by age and gender.

Age group (years)	Females		Males	
	Absolute number	For % of inhabitants	Absolute number	For % of inhabitants
65-69	232	0.018	144	0.012
70-74	347	0.027	177	0.016
75-79	452	0.041	194	0.022
80-84	586	0.061	234	0.038
85-89	575	0.078	184	0.051
90-94	340	0.103	111	0.091
95-99	95	0.115	26	0.130
>100	21	0.127	2	0.067
Total	2648		1072	

women, the need for hospitalization was overall higher in the females' group (694 vs 272).

Discussion

The present study shows that in a medium size province in Northern Italy the falls represent an important cause of morbidity in the elderly population, representing up to 2.9% of the whole ED workload, and up to 13.3% of the visits for patients aged ≥ 65 . These results hence show that the hospital workload induced by falls is globally impressive, roughly corresponding to the whole activity of a medical or orthopaedic ward, in terms of number of admitted patients per year.

A potential limitation of the study is its retrospective nature, and the consequent risk of including subjects non-epidemiologically related to the sample. However, since only two EDs exist in the Province of Parma, it is reasonable to assume that the vast majority of patients admitted to these healthcare facilities are represented by residents, with the exception of a negligible number of subjects occasionally present for tourism.

An Italian study has estimated an average cost of € 5479.09 for fall-related hospitalization in patients aged ≥ 75 years, that could be translated into an annual direct overall expenditure of € 1,621,810.21 for the specific single hospital of the research.¹⁸ According to data provided by this investigation, the overall cost burden of hospitalizing patients for falls in our two hospitals could hence be estimated at € 5,276,363.67 for 2013.

Since the causes of falls are essentially multi-factorial (environment-, person- and activity-related) and at least in part preventable, more efforts should be done to prevent falls in the elderly, for both persons living at home as well as for community-dwelling individuals.

Gait instability has been identified as a rel-

atively consistent risk factor for falls,¹⁹ and inactivity and comorbidity are strong predictors for falls in older individuals compared to active, ostensibly healthy age-matched controls.²⁰ Some underlying medical conditions, such as stroke and arthritis, are also recognized risk factors for falls.²¹⁻²³ In addition, drugs, most notably psychotropic drugs, anti-hypertensive drugs, or multiple medications have been clearly associated with risk of falling.²⁴⁻²⁷

Conclusions

Considering the social and economic burden of such a high rate of hospitalization, preventive strategies should be planned to improve gait ability through exercise programs, general and bone health through adequate dietary and drug delivery, optimizing of antihypertensive, antidiabetic and psychotropic therapy, minimizing the risk of falls. These efforts should also include a careful house engineering, avoiding obstacles and pitfalls, with maximum focus in nursing homes.

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