

Ten years of hip fractures in Italy: For the first time a decreasing trend in elderly women

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Supported by Consulting/speaking by Sanofi-Aventis, AMGEN, Servier, Eli-Lilly, Abiogen to Piscitelli P; Research grant and funding for consulting/speaking by Merck, Sanofi-Aventis, Novartis, Stroder-Servier, Procter and Gamble, Ely Lilly, Roche, Glaxo to Brandi ML and Tarantino U

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Received: October 8, 2013 Revised: March 16, 2014

Accepted: April 11, 2014

Published online: July 18, 2014

neck fractures in the elderly Italian population over ten years.

METHODS: We analyzed national hospitalizations records collected at central level by the Ministry of Health from 2000 to 2009. Age- and sex-specific rates of fractures occurred at femoral neck in people ≥ 65 years old. We performed a sub-analysis over a three-year period (2007-2009), presenting data per five-year age groups, in order to evaluate the incidence of the hip fracture in the oldest population.

RESULTS: We estimated a total of 839008 hospitalizations due to femoral neck fractures between 2000 and 2009 in people ≥ 65 , with an overall increase of 29.8% over 10 years. The incidence per 10000 inhabitants remarkably increased in people ≥ 75 , passing from 158.5 to 166.8 (+5.2%) and from 72.6 to 77.5 (+6.8%) over the ten-year period in women and men, respectively. The oldest age group (people > 85 years old) accounted for more than 42% of total hospital admissions in 2009 ($n = 39000$), despite representing only 2.5% of the Italian population. Particularly, women aged > 85 accounted for 30.8% of total fractures, although they represented just 1.8% of the general population. The results of this analysis indicate that the incidence of hip fractures progressively increased from 2000 to 2009, but a reduction can be observed for the first time in women ≤ 75 (-7.9% between 2004 and 2009).

CONCLUSION: Incidence of hip fractures in Italy are continuously increasing, although women aged 65-74 years old started showing a decreasing trend.

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Key words: Femoral fractures; Hip fragility fractures; Osteoporosis; Hospitalizations; Incidence

Abstract

AIM: To evaluate the hospitalization rate of femoral

Core tip: We evaluated hospitalization rate of femoral neck fractures in the elderly Italian population over ten year-period (from 2000 to 2009). Our data confirm the dramatic social impact of hip fractures in the elderly, although the perception of their clinical and social relevance is still limited in public and medical profession. Despite this, for the first time a reduction in the number of hospitalizations for women aged 65-74 resulted.

Piscitelli P, Feola M, Rao C, Celi M, Gasbarra E, Neglia C, Quarta G, Liuni FM, Parri S, Iolascon G, Brandi ML, Distanze A, Tarantino U. Ten years of hip fractures in Italy: For the first time a decreasing trend in elderly women. *World J Orthop* 2014; 5(3): 386-391 Available from: URL: <http://www.wjgnet.com/2218-5836/full/v5/i3/386.htm> DOI: <http://dx.doi.org/10.5312/wjo.v5.i3.386>

INTRODUCTION

Life expectancy of the Italian population has constantly increased during the last 50 years, so that Italy is currently the Country with the highest percentage of elderly people in the general population in the world, thus representing an interesting case study for all industrialized countries^[1]. People aged ≥ 85 years old are estimated to exceed 12% of the entire population by the year 2050^[1]. In this perspective, chronic and degenerative diseases - including osteoporosis and fragility fractures - will represent a dramatic challenge for health professionals and decision makers. Actually, the World Health Organization considers osteoporosis to be second only to cardiovascular diseases as a critical health problem^[1]. In our previous study, we have shown that incidence and costs of hip fractures in Italy are already comparable to those of acute myocardial infarctions, with costs per patient having been computed at € 13.500 per patient^[2], thus confirming the very high burden of these fractures in terms of expenditures^[3].

Hip fractures, the most catastrophic complication of osteoporosis, result in significant 1-month and 1-year mortality (5% and 20%, respectively)^[4]. Furthermore, 30% of patients are estimated to become permanently disabled, while 40% of them lose the ability to walk independently, and 80% are unable to perform independently activities of daily living after the fracture has occurred^[4].

The correct perception of the epidemiological picture of fragility fractures and their impact on the population over 65 of age is essential. Actually, information about fracture incidence allow institutions to understand the importance of planning large-scale prevention initiatives and to identify the target population who need to be treated.

In our previous researches, we have already provided some pictures about the burden of hip fractures in Italy between the years 2000 and 2005^[5-8]. More recently, a

study carried out by Kanis *et al.*^[9] has classified Italy in the group of nations with the highest incidence of hip fractures, with rates per 100000 being > 300 for women and > 150 for men, respectively. However, in some countries a decreasing trend in the number of hip fractures in elderly people has been observed^[10]. This study aimed to estimate the yearly number of femoral neck fractures that occurred in the elderly Italian population from 2000 to 2009, based on such official information source as hospitalization records.

MATERIALS AND METHODS

Information concerning all hospitalizations occurring in Italian public and private care settings are registered in hospital discharge records, which are collected at the Italian Ministry of Health (National Hospitalization Database, SDO). This information is anonymous and includes the patient's age, sex and diagnosis. The present manuscript focuses on the number of hospitalizations due to femoral neck fractures in Italy from year 2000 to 2009. We assumed that almost all hip fractures occurred in the elderly resulted in hospital admissions, as confirmed by a previous study on this specific topic^[11]. Population data was obtained from the National Institute for Statistics (ISTAT) for each year^[11]. Hip fractures were defined by the following ICD-9CM major diagnosis codes: 820.0 (femoral neck fractures), 820.2 (per-trochanteric femoral fractures), and 820.8 (other femoral neck fracture). We excluded all hospitalization assigned to major diagnosis code 820.1 or 820.3 (open femoral neck fractures) or 821 (all the extensions; diaphyseal and distal femoral fractures) because they were considered likely to be fractures due to high energy trauma. Thus, we have limited our current analysis to femoral neck fractures. Data was stratified by gender and into two age groups (65-74 and ≥ 75 years) and was processed using Stata (StataCorp, College Station, United States) and Excel (Microsoft, Redmond, United States) softwares. We performed descriptive statistical analyses of the incidence in each gender and age subgroup across the ten examined years. The incidence of hospitalization due to hip fractures per 10.000 inhabitants has also been computed. We also performed a sub-analysis over the more recent three-year period (2007-2009), that is the only year with data available per five-year age groups (65-69, 70-74, 75-79, 80-84, and ≥ 85 years old), in order to specifically evaluate the incidence of hip fragility fractures in the oldest people.

RESULTS

We recorded a total of 839008 hospitalizations due to femoral neck fractures in people ≥ 65 years old between 2000 and 2009. Hospitalizations showed an overall increase of 29.8% over the ten-year period (Figure 1). As reported in Figure 1, hospitalizations due to hip fractures were 71762 in year 2000 (15686 men and 56076 women); 76410 in year 2001 (16456 men and 59954 women);

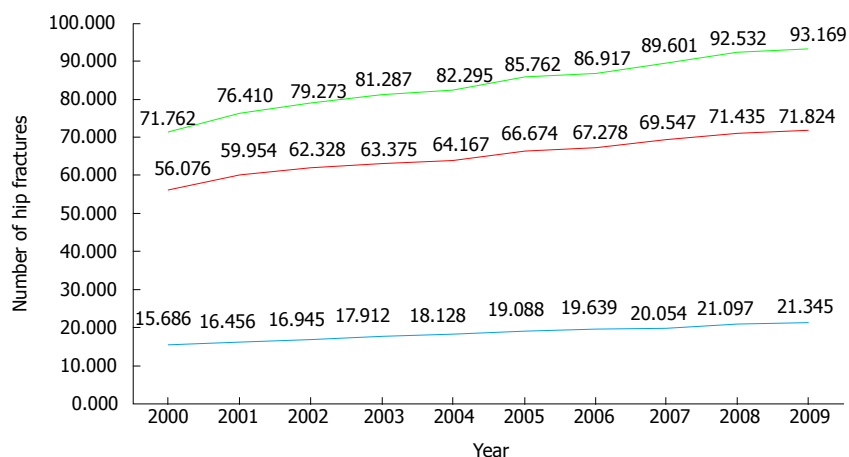


Figure 1 Total number of hip fractures. Number of hospitalizations following hip fractures in Italy in women (red line), men (blue line) and all patients (green line) \geq 65 years old, years 2000-2009 (Italian National Hospitalizations Records).

79273 (16945 men and 62328 women) in year 2002; 81,287 (17912 men and 63375 women) in year 2003; 82295 (18128 men and 64167 women) in 2004; 85762 in 2005 (19088 men and 66674 women); 86917 (19639 men and 67278 women) in 2006; 89601 (20054 men and 69547 women) in 2007; 92532 (21097 men and 71435 women) in 2008; 93169 (21345 men and 71824 women) in 2009.

Incidence per 10000 of hip fractures was 696 in year 2000 (36.3 in men and 92.3 in women); 72.8 in year 2001 (38.1 in men and 97.0 in women); 74.4 (38.6 in men and 99.4 in women) in year 2002; 74.9 (40.0 in men and 99.5 in women) in year 2003; 74.5 (39.6 in men and 99.2 in women) in 2004; 75.9 in 2005 (40.6 in men and 101.0 in women); 75.4 (40.8 in men and 100.1 in women) in 2006; 76.6 (41.0 in men and 102.2 in women) in 2007; 78.1 (42.5 in men and 103.9 in women) in 2008; 77.8 (42.4 in men and 103.5 in women) in 2009.

The incidence of hip fracture shows an increase of 14.5% in men and of 12.1% in women over the ten-year period. When looking at the oldest age group, we recorded an increase in the incidence per 10000 inhabitants in people over 75, which passed from 158.5 to 166.8 (+5.2%) and from 72.6 to 77.5 (+6.8%) in women and in men, respectively.

In the analysis per 5-year age groups (Figure 2), we reported a total of 275302 femoral neck fractures in people over 65 during the last three years (2007-2009). In patients aged \geq 85 years old, hip fracture progressively increased over the three-year period, passing from 35472 (39.6% of total) in 2007 to 37899 (41% of total) in 2008 and 39244 (42.1% of total) in 2009 (Figure 2). In this latter year, people \geq 85 years old represented more than 40% of total hospitalizations due to femoral neck fractures although they accounted for 2.5% of the overall Italian population. Particularly, women aged 85 and over accounted for 30.8% of total hospitalizations, despite representing only 1.8% of the population.

Finally, it is interesting to point out that - for the first time in the recent Italian medical history - the incidence

of hip fractures in women under 75 years of age has increased from 2000 to 2004 by a 5.9% rate, but it has subsequently decreased by a 7.9% between 2004 and 2009, thus showing a clear inversion in its temporal trend (Figure 3).

DISCUSSION

Our study confirms the increasing trend of incidence of femoral neck fractures in the elderly Italian population during the last decade, but first good news has emerged for the first time. Having found a reduction in the incidence in women aged 65-74 years old is a remarkable issue, although they represent a minor proportion (about 10%) of hip fractures occurred in the elderly. When looking at this finding, it must also be kept in mind that some differences are expected between the Italian regions. Actually, our preliminary ongoing analyses of the Tuscany region healthcare system database shows that the decrease in the incidence of hip fractures in older women also involves those aged 75-84 years old (data not presented).

Compared with our previous research^[5-8], we have limited the study to those fractures that occurred in femoral neck among people aged over 65 years old, thus excluding all other hip segments usually interested in cases of high energy trauma. This methodology has allowed us to catch only hip fractures which were likely to be a consequence of osteoporosis (fragility fractures). Actually, in older subjects there is an alteration of bone architecture with decreased bone strength, leading to an increased fracture risk^[1]. These fractures are often due to falls that occur especially in a domestic environment, because of a low-energy trauma in people with an increased risk of falling. Several causes are known to contribute to that, including sarcopenia, a depletion of muscle fibers (occurring especially at the proximal segment of the hip) caused by low levels of vitamin D^[1]. However, the issue of updating the definition of fragility fracture focusing not only on trauma energy but also on patient conditions

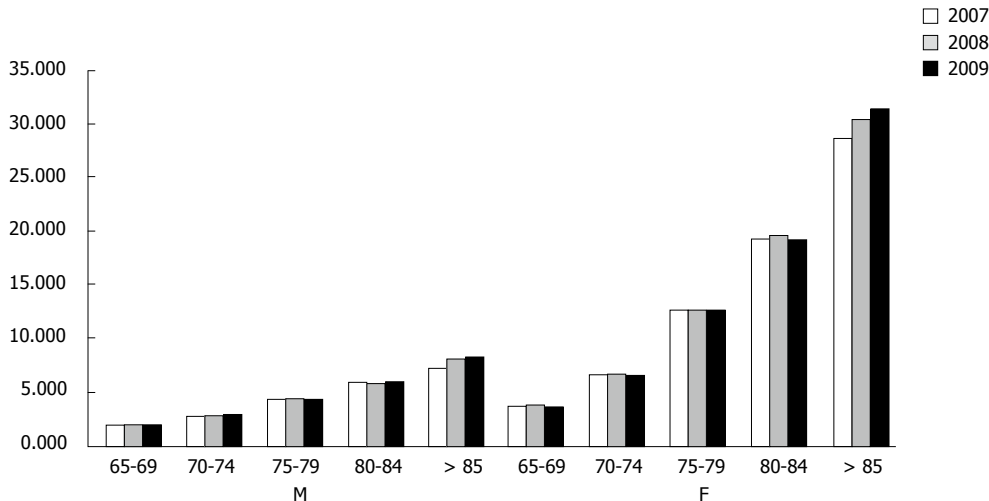


Figure 2 Number of hip fractures per age group. Hospitalizations following hip fractures in Italy in patients ≥ 65 years old, presented by five-year age groups and sex between 2007 and 2009 (Italian National Hospitalizations Records).

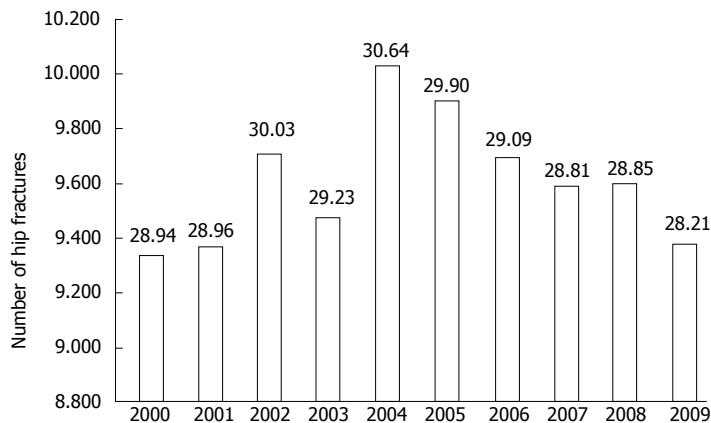


Figure 3 Trend of hip fractures. Decreasing trend in number of hospitalizations following hip fractures and in their incidence per 10000 in women 65-74 years old, years 2000-2009 (Italian National Hospitalizations Records).

should be addressed by the scientific community.

In 2009, the Italian National Healthcare System has paid for more than 93000 hospitalizations, with a constant increase of incidence over the last ten years, as expected according to the progressive aging of the Italian population. Looking at this picture might be useful for all the other industrialized countries who are supposed to cope with similar problems within the next decades. The incidence of hip fractures is particularly growing in people over 75 (especially among women), the age group in which both the prevalence of osteoporosis and the risk of falls are known to be higher^[1,4]. When looking at the different age groups, the risk of being hospitalized because of hip fracture was higher in women (more than twice, particularly in the age group > 75 years old). These findings confirm the crucial role of osteoporosis, which is the most frequent underlying cause of hip fractures in the elderly^[1]. Actually, almost 83% of hip fractures were found to have been experienced by patients 75 years of age or older, in accordance with the higher prevalence of osteoporosis in this age group^[4]. Our findings seem to be

consistent with International Osteoporosis Foundation estimations concerning the overall incidence and costs of hip fractures in Italy and provide detailed information regarding hospitalizations occurring in the elderly age groups^[12]. Furthermore, these results are consistent with the analyses we had already performed^[5-8] and with data from other European or non-European countries, where an increasing trend of hip fractures incidence and costs was shown^[13-19]. These differences can be explained by considering the higher incidence of hip fractures among the oldest age groups in those countries where effective preventive strategies have not yet been fully implemented, especially for nursing home residents, whose risk of fractures is two- or three fold higher than community dwelling elderly people^[20].

Our results confirm the dramatic social impact of hip fractures in the elderly, although the perception of their clinical and social relevance is still limited in the public and in the medical profession. In order to demonstrate this, we have to consider that only 12% of patients with a femoral fracture (which have an increased risk of another

fracture both in the femur and in another skeletal site) receive anti-fracture drug therapy and that the gap between expenditure on pharmaceuticals sustained for drugs to prevent the risk of fracture and active on the prevention of cardiovascular disease remains very high (about 1%-4% *vs* 32% of the national pharmaceutical spending). Our data claim for preventive interventions aimed to primary prevention of osteoporosis and to reduce the incidence of hip fractures above all, as their consequences have a considerable impact on the elderly and their families in terms of reduced levels of health, loss of productivity and quality of life.

In a conclusion, the improvement of standards of care led to a lengthening of life with an increase in the number of people over 75 in Italy. In older subjects there is an alteration of bone architecture with decreased bone strength, leading to an increased fracture risk. These fractures are often due to falls that occur especially in a domestic environment, because of a low-energy trauma, in people with an increased risk of falling. There are several causes that lead to a similar picture, including in particular sarcopenia; the depletion of muscle fibers, especially at proximal level, is caused by low levels of vitamin D. In these subjects comorbidities further aggravate the bone quality, worsening the outcome of the fracture.

Behind every femoral fracture, there is a dramatic picture that requires special attention from physicians and institutions, whereas our results over the last 10 years show that the number of hip fractures increased by about 30%. As the number of people over 65 in Italy - as well as in all industrialized countries - will continue to increase, this picture could become even worse, with a remarkable burden on people and on the healthcare system, unless specific preventive strategies will be adopted.

A good knowledge of the real number of fractures is necessary to set health prevention programs aimed at reducing the incidence of falls and following fractures. A proper allocation of resources will allow to prescribe in subjects with low BMD adequate anti-osteoporotic therapy, reducing the fracture risk. It should be useful to extend this study considering other variables that have not been addressed in this work, as the geographical and seasonal distribution of fractures, to better identify not only intrinsic factors that determine the fracture but also other elements that could increase fracture risk.

This work confirms that the incidence of femoral neck fractures in Italy have increased over a ten-year period. On the other hand, the reduction that we have observed for the first time in the number of hospitalizations, at least for women aged 65-74, might already be an effect of the awareness about the treatment of osteoporosis which has been increasing since the beginning of the millennium.

ACKNOWLEDGMENTS

The authors are grateful to the Department of Studies and Documentation of the Italian Ministry of Health

(Direzione generale del Sistema Informativo - Coordinamento e Sviluppo NSIS) for having provided the data from the National Hospitalizations Database (SDO). The authors are also grateful to Isaac Parker for language revision, to the ISBEM Research Centre and to the Division of Orthopaedics and Traumatology, Tor Vergata Foundation University Hospital, University of Rome Tor Vergata (Rome, Italy) for the medical writing and editorial work.

COMMENTS

Background

Chronic and degenerative diseases - including osteoporosis and fragility fractures - will represent a dramatic challenge for health professionals and decision makers. The World Health Organization considers osteoporosis to be second only to cardiovascular diseases as a critical health problem.

Innovations and breakthroughs

Authors' data confirm the dramatic social impact of hip fractures in the elderly, although the perception of their clinical and social relevance is still limited in public and medical profession.

Applications

The reduction that have observed for the first time in the number of hospitalizations, at least for women aged 65-74, might already be an effect of the awareness about the treatment of osteoporosis which has been increasing since the beginning of the millennium.

Peer review

The manuscript gives information about a reduced incidence of hip fractures in the younger elderly population, but emphasizes an increased incidence in the very old population. The topic has high importance because the number of hip fractures has doubled in the last 30-40 years in many countries.

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