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Original article

Decrease of inpatient mortality for hip fracture in France

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ABSTRACT

Objective: Hip fracture is the most devastating osteoporotic fracture, increasing the risk of mortality. Recent data suggest a decrease in incidence of this fracture. Few data are available on potential changes in mortality. We studied the change of inpatient mortality from 2002 to 2008 in France.
Methods: Data were extracted from the French Hospital National Database. The absolute number of inpatient mortality for hip fracture was described as well as the case fatal rate and mortality rate adjusted on age and gender. Risk factors of inpatient mortality were assessed by multiple regressions.
Results: Inpatient mortality stay decreased from 3057 to 2350 in patients aged 40 years and over and in both gender. Inpatient mortality stays were more important in women and increased with age, but the case fatal rate was higher in men than in women (5.4 vs. 2.8% in 2008). During the study period, the mortality rate (per 1 000 000) varied from 132 to 88 and from 82 to 64 in women and men, respectively. In the older patients, case fatality and mortality rates decreased significantly during the study period. From 2008 data, age more or equal to 85 years, male gender, stay in intensive care and existence of some chronic or acute disease, especially cardiovascular disease, hepatic disease, renal insufficiency, and infection were significant determinants of inpatient mortality.
Conclusion: Inpatient mortality after hip fracture decreased in France between 2002 and 2008, although age, male gender and comorbidities were identified as determinants of inpatient mortality.

1. Introduction

Hip fracture is the most devastating osteoporotic fracture, and is associated with an excess in both short-term and long term mortality. A large proportion of deaths occurred in the first 3 to 6 months after hip fractures and decreased thereafter [1–3]. Age, gender and health and functional status before the fracture are determinants of this mortality [1–2,4–8]. In hospital mortality ranges from 1.6 to 10% in studies conducted in the nineties, and the operative delay is an added parameter of mortality [9–12]. Recent data suggest that epidemiology of hip fracture is changing, with a decrease in incidence [4,13–16]. The analysis of French death certificates from 2000 to 2004 showed that 1.2% of deaths were related to osteoporotic hip fracture [17]. We have shown that in France, an 8% decrease in the incidence of hip fracture in women occurred between 2002 and 2008 [16]. No data are available about potential changes in hip fractures-related mortality. The aim of this study was to describe the inpatient mortality after hip fracture from the data of the French hospital database between 2002 and 2008.

2. Methods

2.1. Data

Data were extracted from the French Hospital National Database. We selected all hospitalizations for which primary diagnosis was hip fracture (ICD-10 codes: S72.0, S72.1, S72.2) in people aged 40 years and over living and managed in Metropolitan France from year 2002 to 2008. We retained hospital stays classified in surgical disease related-groups (DRG) related to surgical management of hip fracture due to osteoporosis in acute care setting [16]. The hospitalizations related to medical DRG including hospital transfer or other surgical DRG related to polytraumatisms, removal of osteosynthesis material, removal or change of prosthesis, reduction of prosthesis, or fractures occurring in a context of cancer or mention of cancer or prosthesis complications as secondary diagnosis were excluded. Included hospitalizations represented 82% of the initial selected set for each year studied.

2.2. Analysis

Data were presented by sex and age in four age groups (40–59, 60–74, 74–84 and ≥ 85 years) for the period 2002–2008. We

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numbered hospital stays with and without immediate death. We described the case fatality rate and the mortality rate standardized by age and gender. The case fatality rate was calculated using as numerator the number of stays with immediate death and as denominator all hospitals stays related to surgical management of hip fractures. The mortality rate was calculated using as numerator the number of stays with immediate death and as denominator the French Metropolitan population for each year studied published by the French National Institute of Statistics and Economic Studies [18]. Mortality rate was presented per million populations (pmp).

Data from 2008 were used to collect potential determinants of inpatient mortality. The following covariables were retained: age, gender, length of stay (LOS), number of diagnoses encoded, number of procedures performed, occurrence of dialysis, stay in intensive care units, comorbidity encoded as secondary diagnoses: respiratory infection, urinary tract infection, other infections, ischemic heart disease, hypertension, heart failure, cardiac arrhythmias, cerebrovascular disease, atherosclerosis, thrombo-embolic disease, dementia, peptic ulcer, diabetes, hepatic disorder, infection, connective disease, chronic respiratory disease, renal insufficiency, other fractures, osteoporosis and cutaneous ulcer.

2.3. Statistics

To study the evolution of the case fatality and mortality rate stratified by gender and age-classes, we performed a test for trend in proportion ($\alpha = 0.001$).

We explored the impact of several variables on inpatient mortality from 2008 data. We described the number of comorbidities encoded for each age-class. Each explanatory quantitative variable was dichotomized according to its median value. All explanatory variables were introduced in a multivariate model (logistic regression). The threshold of a P-value ≤ 0.20 in the univariate analysis (Chi^2 test) was retained for including the variables into the multivariate model. Differences were considered significant when $P < 0.05$.

All tests were performed with R version 2.9.0 [2009–04–17].

3. Results

As shown on Table 1, inpatient mortality for hip fracture decreased from 3,057 (4.7% of all included hospitalizations) to 2,350 (3.5%) from 2002 to 2008. During the study period, the proportion of hip fracture occurring in women varied from 76 to 78% and the proportion of deaths was between 60 and 65%.

Case fatality rate was more important in men than in women, 5.4% and 2.8%, respectively in 2008. This rate decreased significantly for patients aged 40 years and over in both gender and in each age-groups except for the age-group 40–59 in men ($P < 0.001$, Table 1, Figs. 1 and 2).

The mortality rate for hip fracture per million patient decreased significantly from 132 to 88 and from 82 to 64 from 2002 to 2008 in women and men aged 40 years and over, respectively ($P < 0.001$, Table 1). This decrease was also observed in all age-groups ($P < 0.001$), except in the 40–59 and 60–74 age-groups, in men and women. Figs. 3 and 4 focused on the change of the mortality rate in the two last age-group for each gender. Using Year 2002 as reference, a decrease of 27 and 32% of the 2008 case fatality and mortality rate was observed in the age group 75–84 years. The decrease in mortality was most important in the oldest: the decrease was 26 and 44% for patients aged 84 years and over.

From 2008 data, the sum of associated diagnoses encoded increased with age, 7,577, 22,173, 73,166 and 90,585 in the age class 40–59, 60–74, 75–84, and over 84 years, respectively. We described in Table 2 the results of the univariate and multivariate analysis to explain inpatient mortality in 2008. Intensive care, respiratory infection, hepatic disease, heart failure, number of associated diagnoses more or equal to 2, age more or equal to 85 years, cerebrovascular disease, thrombo-embolic disease, male gender, peptic ulcer, renal insufficiency, ischemic heart disease other infection (excluded urinary tract infection) were significant and independent determinants associated with mortality.

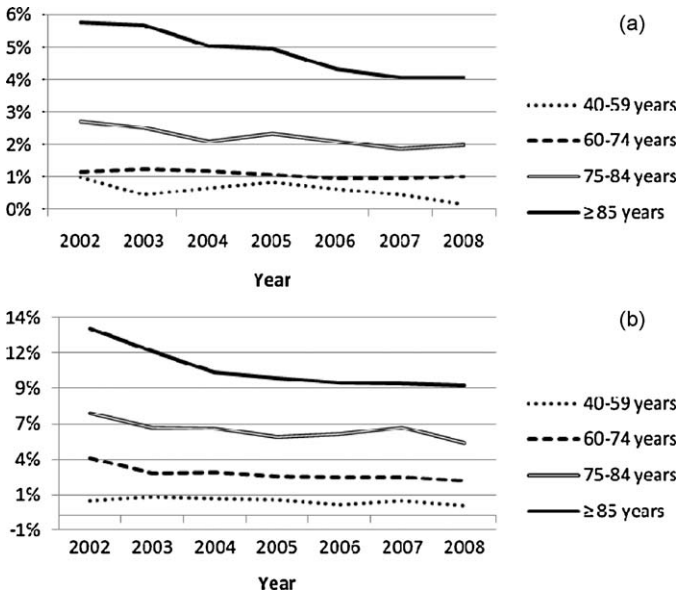

Fig. 1. On the abscissa, the case fatality rate (inpatient mortality for hip fracture/hospitalizations for hip fracture with or without immediate death) for different age-groups in women (a) and in men (b); on the ordinate, the studied year.

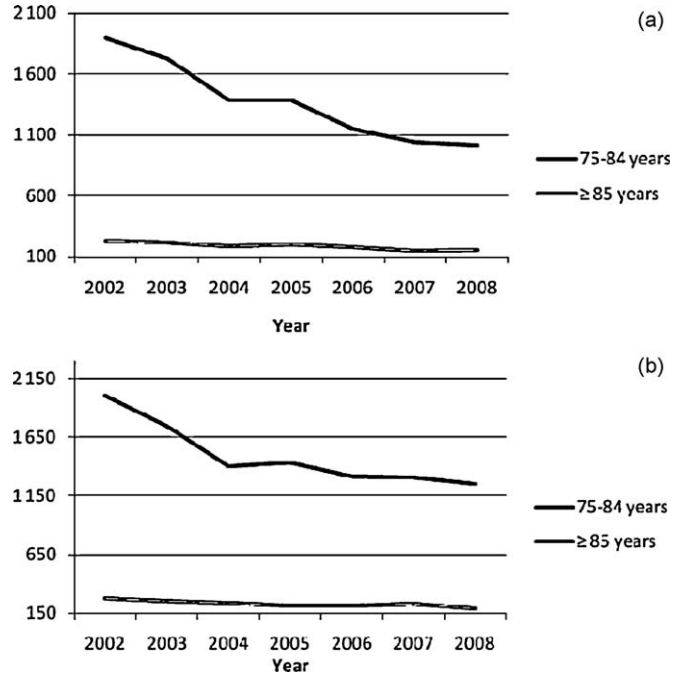

Fig. 2. On the abscissa, the mortality rate per million populations (inpatient mortality for hip fracture/French Metropolitan population) for different age-groups in women (a) and in men (b); on the ordinate, the studied year.