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Original Study

Pelvic Fracture Rates in Community-Living People With and Without Disability and in Residents of Nursing Homes

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A B S T R A C T

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Objectives: There are limited data on the epidemiology of pelvic fractures. The purpose of this study was to calculate incidence rates of pelvic fractures leading to hospital admission and to compare incidence rates between residents of nursing homes and community-dwelling persons with and without care need. **Methods:** Data were retrieved from a database of the largest health insurance company in Bavaria, Germany. Between 2004 and 2009, 10,170 pelvic fractures were observed in 751,101 women and 491,098 men. Age- and gender-specific incidence rates were calculated. Incidence rates were further stratified by setting (nursing home versus community) and functional status (no care need versus care need for those in the community). In addition, the average cumulative risk for a pelvic fracture at different ages was calculated.

Results: The incidence rate increased from 0.54 and 0.38 per 1000 person-years in women and men aged 65 to 69 years to 9.35 and 4.45 per 1000 person-years in women and men aged 90 years and older, respectively. Persons living in a nursing home or living at home with care need had considerably higher incidence rates than community-dwelling older persons without care need. The average cumulative risk at the age of 65 years for an incident pelvic fracture until the age of 90 years was 6.9% in women and 2.8% in men.

Conclusion: The incidence of pelvic fractures leading to hospital admission is higher in women than in men and rises dramatically with increasing age. Persons with care need have a particularly high risk for pelvic fracture.

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Osteoporotic fractures represent an enormous burden on health care systems worldwide.¹ Their incidence is increasing with age, they are more prevalent in women than in men, and they are often associated with low-energy trauma.² Among these fractures, femoral fractures represent the most prevalent type of fracture. The epidemiology of femoral fractures has been studied extensively with incidence rates from different countries and different regions of the world.^{3,4} Hence, the burden of these fractures on health care systems faced with an ageing population has been acknowledged.^{5,6} In

contrast, pelvic fractures have not been extensively studied. In the older population, most pelvic fractures are caused by low-energy trauma (ie, falls from standing height resulting in osteoporotic pelvic fractures),^{7–11} and are usually treated nonsurgically.^{7,12–14} Pelvic fractures can be very painful, reduce mobility considerably, and affect abilities in activities of daily living. Pelvic fractures in older persons are associated with a substantial morbidity and mortality.^{7,10,13,15–17}

The oldest-old are at the greatest risk of suffering a pelvic fracture,^{11,18–23} thus with population aging a considerable increase in the number of pelvic fractures can be expected in most regions of the world. Most data on the epidemiology of pelvic fractures are available from the 1980s and 1990s. However, a considerable increase of age-specific incidences of pelvic fractures over time has been reported.^{11,20} Furthermore, improved diagnostic procedures in recent years, such as the widespread availability of computed tomography,

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may have influenced the detection rate of pelvic fractures. Availability of bisphosphonates and increased primary care management of bone health, changes in population level of physical activity, and dietary patterns may also have influenced risk of pelvic fracture. Therefore, more recent epidemiological data on pelvic fractures are needed.

Like femoral fractures,²⁴ pelvic fractures may be particularly likely in residents of nursing homes. It is good geriatric practice to characterize older persons according to their functional abilities and disabilities rather than by medical diagnosis. Functional disability, along with many other factors, is a consistent risk factor for both pelvic and femoral fractures.^{9,25,26} Therefore age- and gender-specific incidence rates for pelvic fractures may differ according to dependency in the activities of daily living and residential setting. A large German database containing routine data allowed to identify older persons with functional limitations in activities of daily living and to classify older persons according to their residential setting.

The aim of our study was (1) to calculate age- and sex-specific rates of pelvic fracture leading to hospital admission in community-dwelling people without care need, in community-dwelling people with care need, and in residents of nursing homes; (2) to determine the contribution of the 3 subpopulations to the overall burden of pelvic fractures; and (3) to estimate the individual cumulative risks to sustain a pelvic fracture at different ages.

Materials and Methods

Study Population

The dataset used consisted of all people aged 65 years and older who were insured with the *Allgemeine Ortskrankenkasse Bayern* (AOK Bavaria) between January 1, 2004, and June 30, 2009. Bavaria is a federal state with 12.5 million inhabitants in the south of Germany. Health insurance, including cover for care at home or in a nursing home, is statutory in Germany. The AOK is Germany's largest statutory health insurance company. This nonprofit health insurance company covers nearly 50% of the Bavarian population aged 65 years and older.

Long Term Care Insurance and Care Need

In 1995, long term care insurance was introduced in the German social insurance system and is compulsory for all citizens.²⁷ To claim for the long term care benefit, people must need a daily minimum of 90 minutes of assistance with basic activities of daily living (ADLs), such as washing, eating, or dressing, and instrumental activities of daily living (IADLs), such as cleaning or shopping, per day. Persons receiving long term care benefits are allowed to choose care by family, by a community nursing service, or to live in a nursing home of their own choice. Long term care benefits for community-dwelling persons with care need are either financial support for informal care performed by relatives or volunteers or reimbursement of professional care. Information about whether a person needs care at home or whether a person is living in a nursing home is available for all insureds.

Subpopulations

Three subpopulations were defined on the basis of insurance claims: community-dwelling persons *without* care need, community-dwelling persons *with* care need, and residents from nursing homes.

Data Source

We used the routine data collection systems of the health insurance company to gain data on gender, age, care need, date of

admission to a nursing home, and, if appropriate, pelvic fractures leading to hospital care and date of death for each individual. All data are held by the same health insurance company. Therefore, we did not have to link data from different sources.

Pelvic Fractures

Hospital admission or discharge diagnoses were used to identify fractures of the pelvis (S321, S322, S323, S324, S325, S3281, S3283, S3289) in the 10th revision of the International Classification of Diseases (ICD-10). Some persons had more than one pelvic fracture during the observation period. Information on subsequent pelvic fractures was also used. Hospital admissions coding of pelvic fractures that occurred within less than 30 days from a previous fracture were excluded to avoid double coding.

Statistics

All persons insured by the AOK Bavaria and aged 65 years and older on January 1, 2004, were included in the dataset. Persons who became 65 years during the observation period entered the study cohort at the date of their 65th birthday. To present representative distributions of the baseline characteristics of the study population, data from Table 1 were calculated at one point of time (January 1, 2004) and did not consider persons entering the study population later.

Person-years at risk were accumulated between January 1, 2004, or date of entrance into the cohort and the end of the observation period (June 30, 2009), or date of death. If a person changed the subpopulation within the observation period, person-years at risk started again at the date of the assignment to the new subpopulation. To demonstrate the association between age and pelvic fracture rates, 6 age categories were created. Person-time at risk for age-specific fracture rates were assigned to the age interval in which they were accumulated.

The crude incidence rate of pelvic fractures was calculated by dividing the number of fractures by the total number of person-years. The rates are presented as fractures per 1000 person-years. To compare pelvic fracture rates between men and women, age-specific incidence rate ratios with 95% confidence intervals were calculated. To calculate fracture rates of different subpopulations, information

Table 1
Characteristics of Included Participants at Start of the Observation Period (January 1, 2004) and Number of Pelvic Fractures During the Observation Period

	Women	Men
Total, n (%)	590,318 (63.3)	341,879 (36.7)
Age, y, median (IQR)	75.0 (69.6–81.2)	71.9 (68.1–77.1)
No. of pelvic fractures	8545	1625
Persons with 1 pelvic fracture	8174	1572
Persons with ≥2 pelvic fractures	349	49
Community-dwelling persons without care need, n (%)	497,862 (84.3)	310,592 (90.9)
Age, y, median (IQR)	73.6 (68.9–79.1)	71.5 (67.9–76.3)
Community-dwelling persons with care need, n (%)	57,450 (9.7)	23,792 (7.0)
Age, y, median (IQR)	83.1 (78.2–89.0)	78.6 (72.7–84.0)
Residents from nursing homes, n (%)	35,006 (5.9)	7495 (2.2)
Age, y, median (IQR)	85.8 (81.0–90.8)	80.4 (73.5–86.9)

IQR, interquartile range; n, number of participants.

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