Discrepancies in national incidence trends for hip fracture: why does Austria have such a high incidence?

Introduction

Hip fractures have a major impact on public health because of the related morbidity, risk of nursing-home admission and increased healthcare costs [1, 2]. The expected demographic changes resulting from a rapidly ageing population in Western countries have led to prediction of a huge increase in the worldwide incidence of hip fracture. A popularly cited forecast has estimated a rise from 1.7 million in 1990 to 6.3 million in 2050 [3]. However, recent studies of incidence trends have reported conflicting findings. Studies from Finland, Germany and Japan show a slight increase of the age-adjusted incidence [4–6], whereas studies from Switzerland, Australia, Canada and the USA reported a levelling-off or even a decrease [7–11]. Trends are not always equal for gender and residential status [5, 7, 12].

Incidence of hip fracture in Austria

Long-term hip fracture trends in Austria have not hitherto been analyzed. We have therefore investigated the incidence and trends for hip fracture between 1994 and 2006, analyzing data from the national hospital discharge register [13]. We found no levelling-off or downward trend of the incidence at the age of 50 years or older. Among men, crude incidence rates (IR) per 100,000 person years increased from 244.3 (95% confidence interval [CI]: 234.8–253.7) in 1994 to 330.8 (95% CI: 320.8–340.9) in 2006; for women, the respective increase was from 637.3 (95% CI: 624.2–650.4) to 758.7 (95% CI: 745.0–772.4). After adjustment for age and sex the increase in annual incidence was only small but was statistically significant (incidence rate ratio [Irr] per year 1.01, 95% CI: 1.01–1.01, P<0.01) (Fig. 1).

Comparison of Austrian hip fracture data with those of neighboring countries

Using the same methods as in a recently published German study [5], we compared hip fracture incidences in Germany and Austria between 1995 and 2004. We could not use a correction factor for re-admissions and transfers since none has been validated for Austria. The trends in the two countries are comparable over the study period. Hip fracture incidence slightly increased between 1995 and 2004 with a decline in younger people but a significant increase in the age group 75 years and above in both sexes. However, the calculation revealed a consistently 30% higher rate of hip fracture rate in Austria [14] (Fig. 2).

Reasons for the pronounced difference in incidence between these neighboring countries can only be hypothesized. The populations are similar in several main characteristics determining the risk of hip fracture: prosperity measured by gross domestic product per person, genetic factors, and the proportion of migrants (only marginally higher in Austria) [15]. The impact of lifestyle factors such as smoking behavior, sedentary behavior and physical activity could also be expected to be similar, although interpretation is difficult since valid data on lifestyle factors covering the study period are lacking. Data on obesity indicate a slightly higher prevalence in Germany [16]. Unfortunately, comparative data covering a longer period are not available.

Differences between the countries in prescription policies for osteoporosis drugs cannot be excluded, but valid comparison of data on drug sales is impossible since Austria does not have a national drug register. The proportion of citizens living in nursing homes is similar in Austria and Germany [17, 18].
Possible methodological fallacies should be considered carefully. A bias due to differences in coding behavior for hip fracture is unlikely. Completeness of data might be similar, since in both countries the national registers of discharge diagnosis cover almost all hospitals. We could not completely exclude differences in hip fracture-related re-admission rates between Austria and Germany; nevertheless, a potential higher re-admission frequency in Austria is unlikely to explain the 30% higher incidence. The Main Association of Austrian Social Security Institutions made a preliminary partial dataset available, which allowed estimate of numbers of hip fractures related to the admission rate (data made available upon non-disclosure agreement). The proportion of patients among the total number of hospital admissions was 81.7%. The difference might be due to transfer, re-admission or second hip fracture. In Germany the corresponding numbers were 30% in 2001 and 11% in 2006 [19, 20].

It would have been interesting to compare the Austrian and German data with data from Switzerland. However, hip fracture data are available only for the wider Geneva area: results indicate a significant decrease in age-adjusted hip fracture incidence in women, but not in men, despite an increase in mean age and in the population at risk [7]. Analysis of hip fracture trends in persons aged 60 years and above demonstrates that the reversal of the secular trend is due to a decreased incidence among elderly women living in institutions.

Comparison with other neighboring countries is not feasible since reliable data on incidence and trends in hip fracture are lacking.

**Reasons for changes in incidence trends for hip fracture**

The reason for the secular change observed in several countries is an issue of controversy. The increase in average body weight and body mass index has been suggested as meaningful factor. Other reasons might be the improved functional ability of the elderly and possible benefits of recent programs and interventions to prevent falls and subsequent injuries [21].

The impact of antiresorptive osteoporosis medication on the incidence of hip fracture remains unclear. Thus, a Canadian study [10] found that trends toward decreasing rates were evident before the widespread availability of bone density testing and bisphophonates. A study in the USA showed a constant decline of the age-adjusted trends for hip fracture between 1986 and 2005 [11]; antiresorptive agents could not have had a pronounced impact since their market release was not before 1995.

**Fall-related impact on hip fractures**

The impact of falls on hip fractures might be underestimated and thus be underreported.

Numerous studies show that the external force of a fall, rather than osteoporosis, is the strongest risk factor for hip fracture [22, 23] and in fact 90% of hip fractures result from falls [24]. Prevention and treatment of osteoporosis is therefore only one component of hip fracture prevention, and fall reduction programs merit special attention. Järvinen et al. suggest a shift from prevention of hip fractures to prevention of falls; nevertheless, fall prevention is anything but easy.

A recently published Cochrane review summarized 111 fall-prevention studies that included a total of 55,303 community-dwelling participants. Beneficial interventions to reduce the rate of falls in community-dwellers are multidisciplinary, multifactorial health/environmental risk-factors, evaluation, followed by intervention programs (RaR: 0.66, 95%). They are, multiple-component group exercise (RaR: 0.78) and Tai Chi group exercise (RaR: 0.63) interventions. Beneficial effects are also likely for single interventions such as assessment and modification of home hazards in older people with a history of falling (RaR: 0.56), withdrawal of psychotropic medication (RaR: 0.34), and cardiac pacing for walkers with carotid sinus hypersensitivity (RaR: 0.42) [25].

The evidence on hip protectors is conflicting. Earlier studies found protective effects on hip fracture, whereas recent studies could not verify the effectiveness even in high-risk groups such as nursing-home residents. As a consequence, an International Hip Protector Research Group was established to draw standards regarding the biomechanical properties and testing of hip protectors and to clarify the evidence of the anti-fracture effect of different devices [26].

**Future implications of findings on research in Austria**

Many questions emerge from the Austrian data on hip fracture. Since international evidence on risk factors and circumstances of hip fractures cannot necessarily be generalized, meaningful studies to investigate individual-