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Fragility Fractures & Their Impact on Older People

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Osteoporotic fractures, in particular hip and vertebral, are a major health burden worldwide. The majority of these fractures occur in the elderly population, resulting in one of the most important causes of mortality and disability in older ages. Their cost for societies is enormous and is forecast to steadily increase over the coming decades globally. Low bone mineral density (BMD) remains a key preventable risk factor for fractures. Screening and treatment of individuals with high risk of fracture is cost-effective. Predictive tools including clinical risk factors, minimisation of falls risk and public authorities' support to create Fracture Liaison Services are paramount strategies.

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Definition of osteoporosis and osteoporotic fractures

Osteoporosis is defined as a systemic skeletal disease characterised by a low bone mass and a microarchitecture deterioration of bone tissue, with a subsequent increase in bone fragility and susceptibility to fracture [1]. It behaves as a silent disease. A high percentage of affected people are not aware that they have the condition. Consequently, osteoporosis burden is better assessed by measuring the burden of its clinical outcome, i.e. osteoporotic fractures (also known as 'fragility fractures'), which usually occur after a low-energy trauma, such as a casual fall 'from standing height or less'. The osteoporotic fractures with the highest health burden are hip and vertebral fractures,

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which represent a major cause for social and economic costs in present societies. Almost three-quarters of hip and spinal (vertebral) fractures occur among patients 65 years old or over [2]. There are other peripheral fractures considered to be related to osteoporosis, such as forearm, proximal humerus, pelvis, rib, distal femur, proximal tibia and clavicle. Some authors have found that other fracture sites, such as ankle, hand and foot, are associated with low bone mineral density (BMD) and a subsequent increased risk of fracture [3–5], albeit their presence is not always a sign of bone fragility and may reflect a certain mechanism of injury.

Interestingly, fractures occurring in sites other than hip and vertebrae (*non-hip non-vertebral* fractures) constitute more than half of all fractures in elderly population. The health and economic burden derived of such fractures has probably been underestimated in the past, in view of the recent and growing evidence of their contribution in terms of morbidity and mortality [6–9].

Key Messages

- Osteoporosis is a silent disease that affects bone mass and quality and increases risk of fracture.
- Hip and vertebral fractures are the fracture types with the highest health burden.
- The majority of hip and vertebral fractures occur in populations from 65 years of age.
- Non-hip non-vertebral fractures in the elderly are altogether the most common sites of fracture in the elderly, and they have a significant contribution in the health burden derived from fragility fractures.

Health consequences of osteoporotic fractures

The consequences of osteoporotic fractures for an individual range from chronic pain, loss of mobility, and loss of independence to institutionalisation and death [10–12].

Hip is the location of fracture leading to the poorest health outcomes, in part because of the peak incidence of such fractures occurring in populations that are 70–79 years old [10]; therefore, the incidence and subsequent loss of health is considerably higher in developed countries [10]. At 1 year after the hip fracture event, cumulative mortality reaches up to 37% in men and 25% in women, and it is significantly higher than that in the general population [13,14]. This increase in mortality is particularly higher in men [13]. About half of the patients lose their prior level of physical function, and many lose their independence and require long-term care [15–17]. Only half of the survivors will walk again, and often not at the same level as prior to the fracture [15–17]. A high percentage of affected individuals report chronic pain after 1 year post-fracture [11].

Vertebral fractures cause pain and limitation of the spinal movement and can have considerable adverse effect on the overall quality of life [18]. Both prevalent and incident fractures increase steadily with age from 50 to 80 years [19,20]. One-fifth require hospitalisation, and some will require subsequent long-term care [21,22]. Pain and disability become worse with each new fracture, as does the risk of mortality. Fractures occur more often in the thoracolumbar transition. Spinal mobility is impaired even in the absence of significant pain. Despite only one-third of the vertebral fractures being symptomatic [23], undiagnosed vertebral fractures are also associated with pain and disability [21,22]. Comorbidity is common, e.g. kyphosis, restrictive lung disease and spinal stenosis, in particular at advanced ages, and contributes to the burden on quality of life and increased mortality [24]. In a large prospective study in the United States of America (USA), women with one or more vertebral fractures showed 23% greater age-adjusted mortality rate, and this rate doubled in women with 5 or more vertebral fractures [24]. Similar results were drawn from a longitudinal study in Sweden, where 28% of all deaths associated with vertebral fracture requiring hospital admission could be attributable to the fracture itself [25].

Forearm fractures tend to occur in earlier ages than hip and vertebral locations with a peak incidence in women between 40 and 65 years old. Around one-fifth of Colles' fractures (fractures of the distal radius with dorsal radius displacement, with or without ulna fracture) in developed countries

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