EDITORIAL

Fracture risk prediction is a challenge in the diagnosis and treatment of osteoporosis

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Osteoporosis is the most common metabolic bone disease characterized by reduced bone mass and impairment of bone architecture, resulting in increased risk of fragility fractures. The economic and social burden of osteoporosis-related fractures is huge, previously estimated at EUR 37 billion per year in 27 European countries alone.[1] In postmenopausal women, the hospitalization burden of osteoporotic fractures and the relative cost are greater than those of myocardial infarction, stroke, or breast cancer.[1] Within 1 year after a hip fracture, there is an excess mortality of 12% to 30%, and about 20% of patients must be admitted to a nursing facility. Even the underdiagnosed vertebral fractures, which represent the most common osteoporotic fractures, have adverse health consequences, leading not only to deformities, but also to reduced respiratory function and decreased perceived quality of life.[2] Osteoporosis-related fractures are associated with pain as well as increased risk of disability and mortality.[3] Of note, patients with COVID-19 who had been diagnosed with vertebral fractures on admission to the hospital had poorer cardiorespiratory function and a worse disease outcome.[4]

Aging of the population makes osteoporosis an emerging health problem that requires close attention and rapid intervention. By 2050, in all continents except Africa, at least 25% of the population will be aged 60 years or more, and the number of older people in the world will reach approximately 2.1 billion.[5]

The World Health Organization (WHO) operational definition of osteoporosis is based on a T-score equal to or below –2.5 SD as a representation of bone mineral density (BMD) measured through dual-energy X-ray absorptiometry. However, most individuals who sustain fragility fractures are above this cutoff. This inconsistency poses a challenge for physicians in terms of identifying patients who may benefit from current anti-osteoporosis medications. Thus, based on analyses of several databases, a number of clinical risk factors, such as age, previous fragility fracture, parental history of hip fracture, smoking, excessive alcohol intake, and glucocorticoid use, emerged as independently associated with fragility fractures. Using these risk factors and BMD data, fracture prediction algorithms were developed for estimating the clinical risk of fracture.[6] The most known one, FRAX, has been developed by the University of Sheffield based on data from population-based cohorts from Europe, North America, Asia, and Australia. At that time, the University hosted the WHO Collaborating Centre for Metabolic Bone Diseases (1991–2010), and the FRAX tool is based on data generated by that center. However, FRAX was neither developed nor endorsed by the WHO.

The majority of available algorithms promote the identification of patients at high risk for low BMD and/or fragility fractures. Even though the algorithms do not comprise all risk factors and can underestimate the fracture risk, they still serve as valuable tools to support physicians in assessing the fracture risk in individual patients. Independently of the instrumental diagnosis of osteoporosis, the algorithms encourage a process of shared decision-making and enable treatment of patients at high absolute risk of fracture as well as provide reassurance to those at low risk. Apart from FRAX, other risk assessment tools have been developed to identify the patients at high risk of fracture. These include, for example, WEIGHT, SCORE, ABONE, ORAI, OSTA, OSIRIS, MORES, MOST, DeFRA, Qfracture, and the Garvan Fracture Risk Calculator.[7] Recently, a new algorithm for 10-year fracture risk prediction in Polish postmenopausal women, the so-called POL-RISK, has been developed. The predictive variables included in this algorithm were femoral neck T-score, occurrence of a fall within the previous 12 months, number of previous fractures after the age of 40 years, and age.[8]

But which tool should we use? None of them consistently outperforms the others, and complex

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tools are not better than simple ones. Additionally, there are not many head-to-head comparisons performed in similar populations. Obviously, limitations apply to most of these tools; for example, the most frequently used FRAX algorithm only includes dichotomous variables and it does not consider the risk of a fall.[7,9]

Prospective observation of population-representative study cohorts ensures reliability of an algorithm, and such a tool helps general practitioners quickly evaluate the fracture risk, particularly in the postmenopausal women, who represent the main population at the risk of fractures.

However, none of the available fracture risk assessment tools provides a direct indication for antiosteoporosis treatment. As a consequence, the calculated probability needs to be interpreted before any treatment is suggested. In fact, it is necessary to define thresholds above which treatment is beneficial. In order to avoid overtreatment, the risk corresponding to that generated by a previous fracture is considered an indicative threshold for the initiation of treatment. Additionally, it seems that the antifracture effect size of the available antiosteoporosis medications is inversely associated with a patient's absolute risk for fracture, which supports the use of predictive models for selecting patients to be included in future randomized controlled trials of osteoporosis.

The novel POL-RISK tool may be applied for the assessment of indications for therapy in Poland, and can be further used to evaluate the cost-effectivity of treatment in populations at high risk of fracture.

Exposure to specific antiosteoporosis treatments should also be considered in the development of fracture risk algorithms in the future.

ARTICLE INFORMATION

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