Review Article

Fracture risk assessment in the Greek population via the algorithm 'FRAX', and nursing intervention in patients with osteoporosis

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Abstract

Osteoporosis is a chronic skeletal disorder accompanied with a variety of socio-economic adverse outcomes. Trademark of this particular 'silent disease', is the occurrence of low-impact fractures, which is the result of the decreased strength of the bone tissue. It is estimated, that hip fracture incidences in the Greek population, will demonstrate a significant increase until the year 2050. It is an urgent need, to have a better-designed and executed clinical evaluation program for osteoporotic patients, in connection with the ten-year fracture risk assessment tool, FRAX, that is currently implemented all over the world, and has been incorporated in the Greek Guidelines as well. The role of the nurse is also considered important when implementing osteoporosis-related strategies both for identification and for treatment of patients at risk.

Keywords: Fracture Risk, 'FRAX', Greek population, Nurse Intervention, Osteoporosis

Osteoporosis

Definition

Given the unique characterization of a 'silent disease', osteoporosis stands as a chronic skeletal disorder, the main trademark of which is the occurrence of low-impact fractures. The identified fractures are the result of the subsequent components:
• Important decrease of the bone mineral density (BMD) and
• Alteration of the micro-architecture of the bone tissue
The above-described, and to a certain extent age-related changes, contribute to the decreased mechanical strength of the bone[1].

The range of Osteopenia

According to the clinical findings, when screened by Dual Energy X-Ray Absorptiometry (DXA) for the possibility of decreased bone mineral density (BMD), the clinician might allocate the evaluated individual to the following sub-categories:
• Osteopenia, when the bone mineral density T-score is found to be between -1,0 and -2,5 SD and Standard Deviations (SD) below the median normal value of healthy pre-menopausal women and
• Osteoporosis, when the bone mineral density T-score is found to be < -2,5 SD

Osteopenia could be depicted as a pre-osteoporosis stage that requires the health practitioner's attention and potentially medical intervention[2].

Prevalence of the disease - Greek data

According to the data provided by the 'International Osteoporosis Foundation' (IOF), a number of 75 million individuals suffer from osteoporosis in Europe, USA and Japan. The prevalence of the disease, however, as shown by the published literature is considered to be much greater when it comes to female population after menopause. The reported increase of the associated adverse outcomes, is also augmented due to the rise of life expectancy during the last decade.

Regarding the Greek population, what is detected during a time period of 15 years, is a major increase of the occurrence of hip fractures on a scale of 7, 6%[3]. The particular trend remains the same, even after the age-related adjustment of fracture-prevalence. The recorded cases of hip fractures for the Greek population is estimated to be approximately 15.000 - a number that is rumored to reach the 26.000 by the year of 2050[4].

The diagnostic tool 'FRAX'

'FRAX' is an established diagnostic tool, which is used to evaluate the 10-year probability of bone fracture risk, regardless of the individual's gender. It is of great assistance/utility for every clinical health-care practitioner. 'FRAX' was conceived, designed and finally launched by the University of Sheffield via the assistance of the 'World Health Organization' ('W.H.O.') and the supervision of Dr. John A. Kanis. Single out as easily accessible, the 'FRAX' algorithm can be found on the electronic address: https://www.sheffield.ac.uk/FRAX/index.aspx?lang=gr[5,6].

Cut-off scores for the initiation of anti-osteoporotic medication prescription
The Greek version of 'FRAX' algorithm

Up until the year 2011, any kind of therapeutic intervention when treating osteoporosis, was regulated by the referred t-score values of the examined individual. Due to the unavailability of a Greek calibrated version of the 'FRAX' algorithm, the Greek clinical doctors, encountered significant difficulties when it came to precise evaluation of the 10-year fracture risk[7,8]. In the year 2012, the Hellenic Osteoporosis Foundation ('HELIOST'), in cooperation with the University of Sheffield (U.K.) and the Hellenic National School of Public Health ('NSPH'), introduced the Greek version of 'FRAX' algorithm[9]. The Greek version of 'FRAX' algorithm, was based on Greek epidemiologic data, so that it represents the true population of patients. Concurrently, it derives from a long-term clinical study regarding depicting the hip fractures in the Greek area[4].

Cost-effectiveness

Up until now, the Greek health professionals were taking in consideration the U.S.A. thresholds for the initiation or not of anti-osteoporotic treatment - 3% for hip fracture risk, and 20% for major osteoporotic fracture risk[10]. On the whole, it was an urgent demand to have the adjustment of the aforementioned thresholds according to the Greek socio-economic data. Therefore, the Hellenic Osteoporosis Foundation, carried out a 'cost-effectiveness' clinical study, taking in consideration the associated Greek socio-economic data[11].

The outcome of the cost-effectiveness study, indicated that for an individual up to the 75th year of age, the thresholds for the initiation of anti-osteoporotic treatment set up to be 2,5% for the hip fracture and 10% for major osteoporotic fracture. Respectively, as far as the over the 75th year of age individuals, the thresholds are customized to 5% and 15% respectively[11].

The contribution of nursing staff in osteoporosis

In cases of identification of individuals suffering from osteoporosis, the correlated intervention takes place oftentimes in an 'out-patient' clinical setting. At the same time, what stands as intriguing, is the fact that a large number of 'in-patient' individuals remains 'un-screened' for osteoporosis (via the method of DXA). Apparently, there are patients in need of an anti-osteoporotic treatment, or medicaments and they never receive them. To be precise, during the last decade, more than 80% of elderly suffering from a recent hip fracture, did not receive an anti-osteoporotic medication[12]. And this, despite the fact that the recently occurred hip fracture is a strong indication of low BMD and it holds an equally strong prognostic value[12-14].

Recently Siris et al., reported that a large sample of women over the 50th year of age in America, did not undergo the required anti-osteoporotic treatment one year post the initial diagnosis[13]. Additionally, the considerably broad scientific field of geriatrics, provides clinical studies that point out the insufficient evaluation of the prone to falling individuals, with an osteoporosis-related family anamnesis (falling is an independent risk factor for the occurrence of low-impact fractures)[15].

All the preceding data, highlight the importance of early prevention when it comes to the chronic disorder of osteoporosis, and fully display the contribution of the nurse staff in it. Nursing is a health profession that affects a wide range of age-groups, in respect to the associated health issue. What should be clarified is that the nurse's fundamental role, doesn't downgrade the usefulness of other health professions such as e.g. dieticians, physical therapists, ergotherapists etc. even specialized organization helping patients[13].

Nevertheless, beneficial yet constructive results can be achieved by the nursing stuff via the education of the individuals in the community. On the spotlight of these attempts, should be the high-risk for the manifestation of osteoporosis individuals. The elaborate identification of the women with high risk of fracture, remains the primary goal of the nursing stuff. For that purpose, clinical tools are recruited such as the 'FRAX' questionnaire.

Since the identification of the high-fracture risk patient has been processed, the registered nurse in consultation with the treating doctor, recommend as well assists the undergoing of a BMD scan - mainly via DXA method.

According to a review of the available literature that took place in 2010 by Silverman et al.[16], the following problems were depicted regarding the medicaments intake:

- Mistaken or misguided medication intake (e.g. the dosage of the medicaments)
- Irregular medication intake (belated or interrupted admission)
- Abrupt disruption of medicaments

Among the many obligations of the nursing stuff, an individually significant is the knowledge of the instructions given by the treating doctor and the supervision of the patient's compliance.

The educational character of the nursing staff

The modern trends in the field of health, have undoubtedly increase the need for effective coaching and advisory. During the last decade, and increasing number of clinical studies enhances the importance of proper knowledge when it comes to osteoporosis. That statement can be easily appreciated, if someone takes in consideration the incomplete knowledge that defined the up until now intervention.

In order to have a successful intervention, the nursing staff is requested to construct a therapeutic plan. This particular plan of intervention should be designated as personalized for each individual taking in consideration several aspects such as:

- The patient's learning needs - The nursing staff proceeds into the evaluation of the individual's ability to acquire the administered information. At the same time, a brief yet sufficient assessment of the emotional maturity of the patient is taking place.
- A thorough analysis of the individual's needs in regard to education.
- Formation of a teaching (tutoring) pattern
- Evaluation of the collected results.

Following the composition of the therapeutic plan, the nursing staff kicks off the corresponding plan of prevention. Prevention could be portrayed as primary, secondary and tertiary. A coherent strategy of prevention, is the one that encompasses the following:

- Improvement of the calcium and vitamin D intake - via the associated eating habits or via food supplementation.
- Maintaining a lifestyle that encompasses physical activity.
- Annual bone mineral density (BMD) assessment via the Dual X-ray Absorptiometry (DXA) method.
- Required adjustment of daily-living aspects or habits that affect the loss of bone density.

As we can see, all of the before mentioned ways of prevention, are achieved by an experience nursing staff.

Conclusion

The majority of the past interventions, considered to be successful, were defined as multifactorial. The main strategy that was followed, encompasses the initial rise of public awareness, and eventually the revision of beliefs regarding the chronic disorder of osteoporosis. In this particular paper, the importance of a scientific team is emphasized, and especially the role of the nursing staff through the whole intervention. A skilled nurse is able to protect the patient from fractures and other adverse situations, while aiding him to achieve a better life style.

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