Building a cultural alliance for the prevention of fragility fractures among high risk older adults

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As older person increases, particularly those over 75 years, the incidence of fragility fractures will also increase worldwide: hip fracture cases will grow to 6.3 million yearly by 2050 (1). The high-risk of fragility fractures among older persons is related to multisystem age-related changes, including low bone strength, increased risk for falls, global musculoskeletal debilitation, disease-related complications and protracted post-fracture recovery, causing functional decline and mortality (2). The main consequences of fragility fractures result in significant financial and individual costs that are a function of the frailty of persons who experience fractures.

The Screening for Osteoporosis in Older women for the Prevention of fracture (SCOOP) trial (3), published by Lee Shepstone *et al.*, is a pragmatic, randomized, controlled trial designed to assess the effectiveness and cost-effectiveness of a community-based screening intervention among 12,483 women aged 70 to 85 years. The SCOOP trial tested an interesting three-step risk assessment and management of community-dwelling older women. The design of the SCOOP trial was consistent with previous recommendations by NICE 2012 that all women aged 65 years or older and men aged 75 years or older should receive a fracture risk assessment using the FRAX or QFracture tools (4). The proposed algorithm for risk assessment and treatment was previously considered acceptable by patients and general physicians (GPs), and treatment was targeted at women at high risk of hip fracture, compared to a control group receiving standard clinical care (5).

In the SCOOP trial, the researchers used a self-completed screening questionnaire capturing the clinical risk factors useful for the estimation of 10-year FRAX hip fracture probability. The SCOOP self-evaluation screening tool is an exciting approach for the general population. It resembles several established screening programs, but it raises the issue of selection bias of the population. Indeed, the SCOOP participants answering the questionnaire account for 32.9% of the eligible sample, they had better education, higher socioeconomic status, and previous or parental hip fracture. Therefore, the screening tool failed to estimate the fracture risk in 67.1% of the community-dwelling older adults, with 11,068 women who received the questionnaire and did not respond, although a reminder letter of invitation sent to them, and 13,870 of women who refused to participate in the program. The low rate of response among a high-risk population rises several concerns, even more considering the acknowledged acceptability of it by patients and GPs.

The effectiveness of a screening tool in the community-dwelling older population is crucial for the identification and management of high-risk persons. Then, the findings of the SCOOP trial have potential impacts on future healthcare policy and implementation of screening tools

in the primary care setting. The self-evaluation screening tool proposed by the SCOOP trial is mainly based on established clinical risk factors well known to the GPs. The automated capture of these clinical risk factors could be easily implemented in the primary care setting, as already has been done with the FRA-HS algorithm using the electronic patients' clinical charts (6). Intervention for the screening process in the general population by using data already collected in the electronic clinical chart of the GPs should be supported and validated for effectiveness and cost-efficacy.

Then, researchers invited for BMD measurement women who exceed age-specific thresholds of 10-year probability of hip fracture, previously validated for cost-effectiveness (7). Of those with BMD measurement at the femoral neck, only 14% were judged to be at higher risk of fracture after recalculation of FRAX probability of hip fracture including BMD. One can argue about who may benefit more from BMD measurement after FRAX self-completed screening. Given the absence of BMD evaluation in the vast majority of women in the control arm, testing for an interaction between BMD measurement and screening results was not feasible in the study. The advantage added by the BMD measurement the to the individual fracture risk in persons with higher compared with those with lower preliminary risk (i.e., based on self-administered screening questionnaire) remains unknown. This research question may require further investigation.

Recent findings from the SOF study demonstrated that a single assessment of BMD might continue to be predictive of fracture risk for as long as 25 years unless a significant change in health status occurs. Women over age 80 years showed a 25-year risk of fracture of 23%, a higher rate than previously reported perhaps reflecting improvements in survival over the last 15 years among the oldest cohorts. In the SOF study, incorporating BMD into the calculation increases the remaining lifetime fracture probability of older women to alarmingly high levels. The remaining lifetime fracture probability for hip fracture reached thresholds over 30% in women aged 70 and more years with femoral neck T-score below –2.5 SD, getting as high as 60% to 75% in a 75-year-old woman with T-score < –3 SD (8).

The highest fracture risk among the oldest persons has significant clinical implications for physicians and healthcare services, suggesting to pay close attention to their fracture risk and to implement lean strategies to minimize it. It should be also recognized that the effect of mortality overcomes the disability burden at extreme ages because they are more likely to die from natural causes or clinical complications related to immobility or live few years with disability. Then, an estimation of the quality of life added to the last years of life should be performed. Hip BMD is a remarkably persistent predictor of hip and non-vertebral fractures over 20 to 25 years and that self-reported history of any fracture also remains predictive over the very long-term. By following this cohort of older women for so long, we show directly that lifetime risk of hip fracture in community-dwelling women over age 75 years is extremely high. These results strongly support the value of risk assessment and consideration of treatment even in the oldest, highest risk women. Ultimately, in the SCOOP trial researchers recommended to the participants at high-risk of fractures to make an appointment with their GP to discuss treatment options. In the screening arm, GPs prescribed anti-fracture treatments to women identified to be at high risk of hip fracture using the FRAX risk assessment tool with BMD measurement. The intervention thresholds used in the SCOOP trial, defined before the launch of the first NOGG guidance in 2008, ranged from a FRAX 10-year probability of hip fracture of 5.24% in 70–75 year-olds to 8.99% in 85 year-olds. In the recently updated NOGG guidelines, treatment is recommended in patients aged 70 years or older with a 10-year major osteoporotic fracture probability of at least 20% and a hip fracture probability of at least 5% (9). These thresholds have been already associated with acceptable cost-effectiveness as concluded by the recent NICE HTA on oral and intravenous bisphosphonates (10).

During 5 years of follow up, prescriptions of anti-fracture medications were more frequent among participants classified as at high fracture risk, and hip fracture incidence lowered by 28% in the screening intervention arm compared with the control arm. However, there was no effect on the incidence of all osteoporotic fractures or all clinical fractures in the screening arm. Since intervention was targeted only at those women with high risk of hip fracture and hip fracture was a pre-specified secondary outcome of the trial, the authors recognize the need for cautious interpretation of this finding. However, a *post-hoc* analysis confirms that there would be an interaction between baseline risk and screening effectiveness with an estimated reduction in hip fracture risk more than 50% in individuals at very high risk of hip fracture (11).

In view of the long-lasting osteoporosis care gap, the findings of the SCOOP trial timely emphasize the need to consider the effects of screening and treatment

interventions on reducing mortality and disability from the disease (i.e., via a second hip fracture). A changing of the behaviors is encouraged both among patients, who are still refusing effective treatments because of rare side effects, and among providers, who are still prescribing such treatments in about 10% of high-risk patients (12).

There is universal agreement in the scientific community that patients with hip fracture should receive treatment. A large proportion of older adults after hip fracture experience fear of disability and loss of independence, with 20–25% of individuals died within 1 year from hip fracture and the remained 75–80% facing loss of independence and long-lasting disability.

Thus, efforts are required to address the crisis in the treatment of osteoporosis by emphasizing the urgent need to prevent the first hip fracture and the catastrophic loss of independence associated with this event. In this perspective, the identification of individuals at high risk of hip fracture, such as those with a vertebral fracture, is needed and fear of the disability associated with hip fracture might persuade high-risk women to seek treatment.

Identifying individuals at high risk for fragility fractures provides an opportunity for primary and secondary prevention of musculoskeletal injury, then for the promotion of worldwide active aging of the populations. The public health impact of hip fractures on disability adjusted life-years has been already described in a real-life large cohort from Europe and the USA. The burden of disease due to incident hip fracture was estimated as average loss of 2.7% of healthy life expectancy, with an effect 2.29 times greater than years of life lost due to premature mortality, especially in the cohort 60–69 years old and in women (13). Overall, the study showed that disability predominated over mortality, which is in agreement with the global burden of disease study for established market economies (14).

Given the global health impact of fragility fractures, a cultural alliance for the promotion of active aging should be timely pursued between healthcare services, bone specialists, GPs and patients. The bone specialists should contribute to building the awareness of the global health impact of fragility fractures, to increase the attention of GPs to fragility fractures among their patients and improving adherence to guidelines.

Educational activities on fracture risk assessment and management devoted to the GPs should be organized by bone specialists within the health care services. Prevention strategies should be focused and evaluated for cost-effectiveness on high risk older persons. At the same time, fracture liaison services involving the GPs should be established to abridge the journey of high-risk patient (15). In daily clinical practice, GPs prescribe bone X-ray for a recent fragility fracture to their patients without any demand for secondary prevention. A fracture liaison service supporting the automatic capture of the persons at high risk of fracture and facilitating the patient journey within different settings may require much more attention and investigation.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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