PERSONAL PERSPECTIVE

A personal perspective on fracture risk assessment tools

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Abstract

The World Health Organization and the Foundation for Osteoporosis Research and Education have each recently posted fracture risk assessment tools on Web sites. To be most useful, these tools need to provide risk data in a form that is easily used by clinicians as they discuss treatment options with their patients. This article critiques these two tools and offers clinicians suggestions for key elements that should be included in fracture risk reports. Reports based on risk assessment tools need to provide data in a meaningful form that patients can easily grasp. Much more than risk numbers are needed, and, ideally, fracture risk tools should be integrated into bone densitometry reporting or placed into comprehensive, user-friendly, decision aids.

Key Words: Fracture – Risk assessment – Osteoporosis – Risk counseling.

Creators of risk models expend considerable effort making appropriate assumptions, determining accurate calculations, carefully considering complex variables that create the “black box” that we, as clinicians, never see. Although clinicians may be curious about what goes into making a new risk model and that model’s strengths and limitations, we are most concerned about whether we can use it as a tool to improve the way in which we practice. A good tool should be appropriate to the job, should allow us to do that job better, and should make our work easier. In this light, let me share my perspective on two recently posted Web-based fracture tools, the World Health Organization’s FRAX (http://www.shef.ac.uk/FRAX) and the Foundation for Osteoporosis and Education’s FRC (http://riskcalculator.fore.org).

When do we need fracture risk tools? It would be appropriate to estimate fracture risk whenever bone density test results need to be explained. Fracture risk could also be included in general risk counseling, even if bone density has not been assessed. Certainly, risk data should be provided when counseling patients about the decision to take a drug to reduce the risks of osteoporotic fractures. These same risk data help providers determine whether to prescribe a drug to reduce risk and how enthusiastic we should be in recommending treatment.

Both the FRAX (Fig. 1) and the FRC (Fig. 2) tools allow easy entry of bone mineral density (BMD) results and several clinical risk factors. Using FRAX, you can enter either hip T score or hip Z score, whereas FRC asks for hip T score only (converting T to Z internally). FRAX, being an international model, requires input of height and weight in meters and kilograms, but offers a conversion sidebar. Both tools provide options to calculate fracture risks for men as well as women and for four ethnicities (white, Hispanic, Asian, and black).

Once the input data are submitted, both tools quickly produce the estimated risk of hip fracture alone and the risk of any one of four osteoporotic fractures (hip, wrist, upper humerus, and clinically apparent spine fractures). Both tools express the risks as 10-year percentages and both allow printing of both input variables and risk results. The FRC shows the patient’s risk graphically, superimposed on the average risk for the same gender and ethnicity. Additionally, only the FRC tool categorizes risk as low, medium, and high.

Several lines of reasoning support the concept of categorizing risk. The first is cost-effectiveness. Recently, the National Osteoporosis Foundation (NOF) sponsored updates of its US cost-effectiveness analysis for osteoporosis treatment.1,2 These analyses are based on a 35% risk reduction from treatment and use rates obtained from the US version of FRAX to calculate cost-effectiveness. The conclusions have been used to update the NOF’s prevention and treatment guidelines.3 These analyses and guidelines support the following thresholds for cost-effective treatment: 20% 10-year risk for any one of four fractures and 3% 10-year risk for hip fracture alone. Thus, we can assign high risk to estimates above these thresholds.

Cost-effectiveness remains an important guideline for good stewardship of resources and for determining appropriate groups to target for treatment. However, it is not the...
primary factor in making clinical decisions and is not something we use in counseling patients.

The second reason for categorizing risk is a practical one: it helps in counseling patients. In my experience, when risk gets into “double digits,” patients begin to get concerned, and when risk exceeds 20% (1 in 5), they often opt to take treatment to reduce that risk, even if the treatment is only partially effective (eg, reducing risk by 35%-50%), inconvenient, or expensive. It is interesting to note that the US cardiovascular risk model also categorizes a 10-year risk of 20% as high and the Canadian radiologists’ organization overseeing osteoporosis risk reporting initiated this same 20% threshold in 2005.

Output from a fracture tool should provide information in several different ways because not all patients receive and digest information about treatment in the same way. For a tool’s report to enhance the counseling process, in addition to showing risk percentages, it should list the individual risk factors that go into the calculation; should graphically display risk in red, yellow, or green zones; should compare the patient’s risk with that of her peers; and should provide odds of a fracture (eg, 1 in 5).

A study of physician prescribing enthusiasm suggests that presentation of quantitative risk data influences the likelihood of bisphosphonate prescribing, especially in the case of younger osteopenic women who are at low risk of fracture. In the Kaiser Foundation Health Plan of Northern California, when 240 regular users of bone densitometry testing and prescribers of alendronate were provided with quantitative risk data (vs clinical data and BMD alone), the percentages of physicians likely to prescribe alendronate to a hypothetical younger, osteopenic woman dropped from 28% to 10%. At The North American Menopause Society 2007 Annual Meeting, we tested the likelihood of bisphosphonate prescribing among physician attendees who regularly prescribed drugs for osteoporosis. By random assignment, 59 attendees received BMD and clinical data and 57 received these data plus a graphic display of 10-year fracture risk. In the case of a 55-year-old osteopenic, but otherwise healthy woman, the likelihood of prescribing dropped from 22% to 4% (P < 0.004) when the graphic display was provided.

A recent survey study also using hypothetical case scenarios showed quite similar choices were made by patients and providers, depending on how treatment benefit was presented. When relative risk reductions in osteoporotic fractures were given, 97% of providers recommended and 86% of patients showed interest in taking pharmacotherapy. When absolute risks and absolute risk reductions were provided, these proportions decreased to 56% and 57%, respectively.

Any fracture tool will invariably have limitations based on compromises made by its creators who must work with limited epidemiological data and a need for simplicity. As a result, clinicians must add their clinical acumen when interpreting and using results. Two examples are worthy of special comment. Neither FRC nor FRAX includes input for the tendency to fall; they compensate for this by age-adjusting the fracture risk. If an individual patient shows greater than age-expected risk, then the clinician must adjust the tool’s results upward. Neither FRC nor FRAX allows
spine BMD input because these data were not available from most contributing observational studies. However, several published osteoporosis guidelines, including those from the International Society for Clinical Densitometry, The North American Menopause Society, and the Canadian Association of Radiologists, recommend using the lower of hip and spine BMD results when assessing fracture risk. Thus, when spine BMD is considerably lower than hip BMD, the astute clinician should factor this into risk assessment.

What should be the approach to a younger patient with very low BMD but fracture risk data that are not high? Even in the case of a 50-year-old woman free of other risk factors, both tools produce a high hip fracture risk (≥3%) whenever the Z score is less than −2.0 (T score −2.8 at age 50 y). However, any patient whose BMD is below the normal-for-age range (ie, Z score < −2.0) should be fully evaluated for secondary causes of osteoporosis. This may require referral to those with expertise in this type of evaluation.

How will providers use the Web-based fracture risk tools? The Foundation for Osteoporosis and Education tested the willingness of providers to use a Web-based fracture risk tool. They mailed invitations to 241 providers who had recently referred patients for bone densitometry, asking them to input clinical and BMD data into this free Web tool; only 5% accessed the tool. Thus, we can expect that most providers will not take the trouble to enter data into these Web tools. I suspect that few patients will access these tools; most prefer one-on-one discussions and will not be satisfied with a Web-based fracture risk assessment. To make a fracture risk tool meaningful, it needs to be combined with bone densitometry reporting or embedded into comprehensive, user-friendly, treatment decision aids.

FRAX is an excellent start, being far better than the T score alone in estimating risk. However, the World Health Organization team developing FRAX was circumscribed in its creative efforts; the tool was never intended to stand alone, but was expected to feed into local decision aids based on national norms and available resources. The NOF has spurred integration of FRAX into practice by promoting cost-effectiveness analyses and promulgating clinical guidelines for osteoporosis. NOF is currently working with the US Food and Drug Administration and bone densitometry machine manufacturers to integrate FRAX into bone density reports. I hope that as they move forward, the creators of
these new “tools of our trade” will consider how to make them easy for providers to use and meaningful to our patients. FRAX and FRC may be better than the tools that we have had up to now, but they are likely to sit on the cyberspace shelf until they are integrated into user-friendly vehicles. Most importantly, those who create and implement these new applications need to know that to do the best job of osteoporosis risk assessment and counseling, clinicians need more than numbers.

REFERENCES