

Position Development Paper

FRAX[®] Bone Mineral Density Task Force of the 2010 Joint International Society for Clinical Densitometry & International Osteoporosis Foundation Position Development Conference

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Abstract

FRAX[®] is a fracture risk assessment algorithm developed by the World Health Organization in cooperation with other medical organizations and societies. Using easily available clinical information and femoral neck bone mineral density (BMD) measured by dual-energy X-ray absorptiometry (DXA), when available, FRAX[®] is used to predict the 10-year probability of hip fracture and major osteoporotic fracture. These values may be included in country specific guidelines to aid clinicians in determining when fracture risk is sufficiently high that the patient is likely to benefit from pharmacological therapy to reduce that risk. Since the introduction of FRAX[®] into clinical practice, many practical clinical questions have arisen regarding its use. To address such questions, the International Society for Clinical Densitometry (ISCD) and International Osteoporosis Foundations (IOF) assigned task forces to review the best available medical evidence and make recommendations for optimal use of FRAX[®] in clinical practice. Questions were identified and divided into three general categories. A task force was assigned to investigating the medical evidence in each category and developing clinically useful recommendations. The BMD Task Force addressed issues that included the potential use of skeletal sites other than the femoral neck, the use of technologies other than DXA, and the deletion or addition of clinical data for FRAX[®] input. The evidence and recommendations were presented to a panel of experts at the ISCD-IOF FRAX[®] Position Development Conference, resulting in the development of ISCD-IOF Official Positions addressing FRAX[®]-related issues.

Key Words: Osteoporosis; fracture risk; FRAX; ISCD; official positions.

Background

FRAX[®] is a fracture risk assessment algorithm developed by the World Health Organization (WHO) in cooperation

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^aPosition Conference members: See [appendix 1](#).

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with other medical organizations and societies. Using easily available clinical information and femoral neck bone mineral density (BMD), when available, FRAX provides an estimation of the 10-year probability of hip fracture and major osteoporotic fracture (hip, clinical vertebral, proximal humerus, distal forearm) in men and women from age 40 to 90 years. FRAX can be used as a component of guidelines for country-specific fracture risk thresholds at which it is likely to be cost-effective to initiate pharmacological therapy to reduce fracture risk. However, the application of FRAX in

clinical practice has raised many questions regarding the information selected for input and the possible underestimation or overestimation of fracture risk in some patients. In order to assist physicians in deriving the greatest possible clinical value from using FRAX, the International Society for Clinical Densitometry (ISCD), in cooperation with the International Osteoporosis Foundation (IOF), convened the FRAX Position Development Conference (PDC) in Bucharest, Romania, on November 14, 2010, following a two-day collaborative meeting of the ISCD and IOF - "Interpretation and Use of FRAX in Clinical Practice." Three task forces, each of which was divided into subgroups, were asked to review the medical evidence of assigned topics and make recommendations for ISCD-IOF Official Positions at the PDC. This is an overview of the subgroups of the FRAX BMD Task Force- FRAX BMD, FRAX Quantitative Ultrasound (QUS), and FRAX Simplified.

FRAX BMD Subgroup

Subcommittee Chair: Paul D. Miller

Subcommittee Members: Doug C. Bauer, Patricia Clark, Robert G. Josse, Aliya A. Khan

The ISCD recommends that the diagnosis of osteoporosis in clinical practice be made according to the lowest T-score of the lumbar spine, total hip, femoral neck, or distal 1/3 (33%) radius, if measured, with dual-energy X-ray absorptiometry (DXA). FRAX currently allows for the input of BMD for only the femoral neck by DXA. For some patients, the femoral neck BMD may not be valid (e.g., structural abnormalities, surgical hardware) or measurable (e.g., patient's weight exceeds the weight limit of the table, patient unable to be placed on the table due to disability). In others, the BMD at other skeletal sites may be much lower than the femoral neck, suggesting that FRAX may underestimate fracture risk. The FRAX BMD Subgroup was asked to review the evidence supporting the use of lumbar spine and distal 1/3 radius BMD to predict fracture risk and whether these skeletal sites should be included in the FRAX algorithm.

FRAX QUS Subgroup

Subcommittee Chair: Judith E. Adams

Subcommittee Members: Robert A. Adler, Glen M. Blake, Didier B. Hans, Marc-Antoine Krieg, Alireza Moayyeri

In world regions where DXA is not available, accessible, or affordable, FRAX may be used without BMD input. However, the prediction of fracture risk is more robust when BMD is included. QUS devices are less expensive than DXA, use no radiation, are portable, and are available in many locations where DXA is not. Although QUS cannot be used to diagnose osteoporosis with the WHO criteria based on DXA-derived T-scores and QUS is not useful to monitor patients treated for osteoporosis, the question has been raised whether QUS-derived data can play a greater role in the management of osteoporosis. This subgroup was asked to review the medical evidence on the use of QUS-measured parameters of the

calcaneus to assess fracture risk and whether these values could be included in the FRAX algorithm.

FRAX Simplified Subgroup

Subcommittee Chair: Jonathan D. Adachi

Subcommittee Members: Adolfo Diez-Perez, David L. Kendler, Roman R. Lorenc, Basel K. Masri

FRAX input currently includes patient demographics (age, sex, height, weight) and the presence or absence of seven clinical risk factors for fracture, as well as optional femoral neck BMD. For the busy clinician, a simpler version of FRAX might offer greater clinical utility without significant loss of fracture predictability. This subgroup was asked whether FRAX was useful and accurate without BMD, and under what circumstances it might be appropriate to use FRAX without BMD. It was also charged with reviewing the evidence regarding the strength of each of the FRAX risk factors in predicting fracture risk, and whether fewer risk factors could be used with FRAX without significant loss of predictability. Finally, the validity of including the rate of bone loss as an additional risk factor in the FRAX algorithm was addressed.

Appendix. Position Conference Members

Organizers: Didier B. Hans (Chair), Cyrus Cooper (Co-chair), Sanford Baim, Bess Dawson-Hughes, John A. Kanis, William D. Leslie, Marjorie M. Luckey, Rene Rizzoli, Catalina Poiana, John P. Bilezikian (Moderator), Socrates E. Papapoulos (Co-moderator).

FRAX[®] Clinical: Eugene V. McCloskey (Chair), Neil Binkley (Co-chair), Jonathan D. Adachi, Sanford Baim (Program committee liaison), Robert D. Blank, Steven Boonen, Susan B. Broy, Olivier Bruyere, Manju Chandran, Cyrus Cooper, Bess Dawson-Hughes (Co-program committee liaison), Richard Eastell, Kris Ensrud, Hans P. Dimai, Joseph Foldes, Patrick Garnero, Piet P. Geusen, Andrea Griesmacher, Marian T. Hannan, John A. Kanis, Michael Kleerekoper, Marc-Antoine Krieg, Bente Langdahl, Andrew Laster, Edward S. Leib, Tahir Masud, Mike McClung, Howard Morris, Sergio Ortolani, Kenneth G. Saag, Ethel Siris, Stuart Silverman, S. Bobo Tanner, Tommaso Trenti, Samuel Vasikaran, Peter Vestergaard, Denys A. Wahl.

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FRAX[®] International: Jane A. Cauley (Chair), Ghada El-Hajj Fuleihan (Co-chair), Asma Arabi, Andrew Calderon, Zhao Chen, Siok Bee Chionh, Jeffrey Curtis, Michelle E. Danielson, Saeko Fujiwara, David Hanley, Heikki Kroger, Annie Kung, Olga Lesnyak, Anne Looker, Marjorie M.

Luckey (Program committee liaison), Dan Mellstrom, Jeri Nieves, Wojciech Pluskiewicz, Rola El Rassi, René Rizzoli (Co-program committee liaison), Sergio Ragi-Eis, Anne-Marie Schott-Pethelaz, Stuart Silverman.

Expert Panel: John P. Bilezikian (Moderator), Socrates E. Papapoulos (Co-moderator), Jonathan D. Adachi, Robert D. Blank, Roland Chapurlat, Wu (Paulo) Chih-Hsing, Edward

Czerwinski, Aldolfo Diez Perez, Hans P. Dimai, Ghada El-Hajj Fuleihan, Saeko Fujiwara, Ruxandra M. Ionescu, John A. Kanis, Mike McClung, Sergio Ragi-Eis, Jan Stepan, Kenneth G. Saag, John T. Schousboe, Wei Yu, Cristiano Zerbin.

Supporting Persons: Peter D. Brown (ISCD), Patrice McKenney (IOF), Helena Johansson, Judit Nagy, Anders Oden and Denys A. Wahl.