

A simple clinical tool that included age, weight, and estrogen use helped to select women for bone densitometry

Cadarette SM, Jaglal SB, Kreiger N, et al. Development and validation of the Osteoporosis Risk Assessment Instrument to facilitate selection of women for bone densitometry. *CMAJ*. 2000 May 2;162:1289-94.

QUESTION

Can a simple screening tool accurately identify which women are at increased risk for osteoporosis and should have bone densitometry?

DESIGN

A population-based cohort study, the Canadian Multicentre Osteoporosis Study (CaMos), provided data for the derivation and validation of the screening tool.

SETTING

Hamilton, Kingston, and Toronto, Ontario, Canada.

PATIENTS

1376 women ≥ 45 years of age (mean age 63 y, 95% white), who had had dual-energy radiographic absorptiometry testing at both the femoral neck and lumbar spine (L1 to L4) and had a Mini-Mental State score > 20 . Exclusion criteria were previous diagnosis of osteoporosis or current use of bone-active medications other than ovarian hormones. The derivation cohort comprised 926 randomly selected women, and the validation cohort comprised 450.

DESCRIPTION OF PREDICTION GUIDE

Of 6 predictors of low bone-mineral density (BMD) (age, weight, current estrogen use, menopause, physical activity, and previous minimal trauma fracture at ≥ 45 y of age), 3 were selected for inclusion in the final model, the Osteoporosis Risk Assessment Instrument (ORAI): age (score of 15 if ≥ 75 y, 9 if 65 to 74 y, 5 if 55 to 64 y, and 0 if 45 to 54 y), weight (score of 9 if weight < 60 kg, 3 if 60 to 69 kg, and 0 if ≥ 70 kg), and current estrogen use (score of 2 if no and 0 if yes).

MAIN OUTCOME MEASURE

Low BMD (BMD ≥ 2 SDs below the mean for young Canadian women at either the femoral neck or lumbar spine).

MAIN RESULTS

A score ≥ 9 identified 90% of women with a BMD ≥ 2 SDs below the mean and was

therefore chosen as the recommended threshold for BMD testing. This score had moderate specificity but high sensitivity for the diagnosis of low BMD. Similar sensitivities, specificities, and positive and negative likelihood ratios were found for the derivation and validation cohorts (Table).

CONCLUSION

A simple screening tool that included age, weight, and current estrogen use helped to identify women who were at increased risk for osteoporosis and who should therefore have bone densitometry.

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Test properties of the screening tool (score ≥ 9) for derivation and validation cohorts for women who had low bone-mineral density*

Sample	Sensitivity (95% CI)	Specificity (CI)	+LR	-LR
Derivation	90% (85 to 94)	45% (41 to 49)	1.6	0.22
Validation	93% (86 to 97)	46% (41 to 52)	1.7	0.14

*LRs defined in Glossary and calculated from data in article.

COMMENTARY

The ORAI was designed to identify women who would benefit from bone densitometry. The objectives of this screening tool are to select a population of women in whom bone densitometry could be avoided without substantially increasing the risk of missing a diagnosis of significant osteopenia or osteoporosis. The ORAI identified many women who were likely to have low BMD, but similar to existing instruments, it failed to reach an appropriate level of specificity. However, the use of such an instrument could potentially reduce the costs of bone densitometry when compared with a program of mass screening. The ORAI provided similar results to those obtained with the Simple Calculated Osteoporosis Risk Estimation (SCORE) instrument (1). The small differences between the 2 instruments could be because of different study populations. It would be interesting to see whether the results vary when other clinically useful diagnostic end points are used: either a T-score < -2.0 with a fracture or a World Health Organization definition of established osteoporosis (i.e., a T-score ≤ -2.5 and ≥ 1 fracture).

Future studies might consider using 2 thresholds: one to identify women with a very low risk for low BMD osteoporosis who should not have bone densitometry and one for those with a very high risk for osteoporosis who should be treated immediately, regardless of BMD testing. BMD measurements could be done for those with scores between these 2 thresholds. Subsequent economic analyses to evaluate the cost-benefit of such screening strategies should also be considered.

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Reference

1. Lydick E, Cook K, Turpin J, et al. Development and validation of a simple questionnaire to facilitate identification of women likely to have low bone density. *Am J Manag Care*. 1998;4:37-48.