Cost-effectiveness of different screening strategies for osteoporosis in postmenopausal women

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective of the study was to assess the cost-effectiveness of various screening strategies for osteoporosis in postmenopausal women. The authors concluded that many strategies for screening were cost-effective, including strategies involving screening initiation at age 55 years. No strategy substantially outperformed another. Overall quality of the study methodology was good. Some elements were not reported in sufficient detail to make a full assessment, but the authors’ conclusions appear appropriate given the analysis undertaken.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of various screening strategies for osteoporosis in postmenopausal women.

Interventions
The screening strategies were: three Dual-energy x-ray absorptiometry (DXA) strategies (DXA of the femoral neck and lumbar spine plus treatment if the T-score is -2.5 or less at either site, -2.0 or less and -1.5 or less); two calcaneal quantitative ultrasonography (QUS) strategies (QUS with subsequent DXA screening if the QUS T-score is -1.0 or less plus treatment if the DXA T-score is -2.5 or less and QUS T-score is -0.5 or less plus treatment if the DXA T-score is -2.5 or less); and two SCORE (Simple Calculated Osteoporosis Risk Estimation) strategies (SCORE prescreening with DXA screening if the SCORE result is 7 or greater plus treatment if the DXA T-score is -2.5 or less and the SCORE result is 7 or greater plus treatment if the DXA T-score is -2.0 or less or DXA T-score -1.5 or less with an additional osteoporosis risk factor or age 80 years or over).

For each screening strategy, the authors evaluated screening initiation at 55, 60, 65, 70, 75 and 80 years of age, and with 3 repeated screening intervals (1-time screening, re-screening every 5 years, or re-screening every 10 years).

Location/setting
USA/Outpatient secondary care.

Methods
Analytical approach:
An individual-level state transition model of osteoporosis screening and treatment was used to assess the costs and outcomes of each of the different strategies under study. The model was validated by comparing the model's predictions about life expectancy and fractures with actual outcomes reported in different USA sources. A lifetime time horizon was used. The authors reported that the perspective was that of the payer.

Effectiveness data:
Clinical and effectiveness data were derived from previously published studies and national sources. The main measures of effectiveness were sensitivity and specificity of QUS and SCORE as prescreening tests. These estimates of effectiveness were derived from two published studies. Baseline DXA T-score values were derived from a national survey (femoral neck) and from a DXA manufacturer (lumbar spine).
Monetary benefit and utility valuations:
The authors reported that health state utility values were derived from a nationally representative non-institutionalised sample of elderly women. Disutilities associated with fractures, nursing home residence and adverse events were derived from published studies.

Measure of benefit:
Quality-adjusted life years (QALYs) gained were used as the summary measure. As benefits could be generated over the lifetime of the patient, future benefits were discounted using an annual rate of 3%.

Cost data:
Direct costs included in the analysis were for screening tests, oral bisphosphonate treatment, physician visits, fracture-related treatment, nursing home stays and adverse events. Nursing home rates were derived from a published study. Costs for fracture-related treatment and other medical services were from Medicare diagnosis-related group information, reimbursement rates and published studies. The price year was 2010. All costs were reported in USA dollars ($). Costs were discounted using an annual rate of 3%.

Analysis of uncertainty:
The authors undertook a probabilistic sensitivity analysis by fitting probability distributions alongside all model parameters.

Results
A large number of strategies were assessed (only a summary of the incremental results are presented).

At a willingness to pay threshold of $50,000 per QALY gained, the most cost-effective intervention was DXA -2.5 at age 55 and re-screening every five years, which had an incremental cost-utility ratio of $45,450 when compared to SCORE -2.5 at age 55 with re-screening every five years.

At a willingness to pay threshold of $100,000 per QALY gained, the most cost-effective intervention was DXA -2.0 at age 55 years with re-screening every 10 years, which had an incremental cost-utility ratio of $94,210 when compared with DXA -2.5 at age 55 with re-screening every five years.

The authors reported that the results of the probabilistic sensitivity analysis did not reveal a consistently superior strategy.

Authors' conclusions
The authors concluded that many strategies for screening were cost-effective, including strategies that involved screening initiation at age 55 years. No strategy substantially outperformed another.

CRD commentary
Interventions:
The interventions under study were reported adequately.

Effectiveness/benefits:
The authors adequately reported all the clinical and effectiveness parameters used in the model, including the source from which they were derived and the base case value. Additional details of the methodology were reported in supplementary online material. The authors did not report whether published studies were identified through a systematic review of the literature so it was not possible to determine whether the best available evidence was used to inform the model. There was insufficient detail for the estimation of the utility weights to assess whether the population was truly representative of the population being modelled.

Costs:
The perspective adopted in the economic analysis was explicitly reported to be that of the payer. It appeared that all major relevant costs were included for that perspective. Sources for costs and resource use were adequately reported. The price year, time horizon, discount rate used and currency details were all explicitly reported. Resource use was not presented in detail (which may limit generalisability) but on the whole the costing detail was adequate.
Analysis and results:
Data were synthesised by use of a state transition model. Adequate details of the model were provided and included a graphical depiction. The results were validated (in terms of life expectancy and number of fractures) by comparing them to that of previously published USA data. Model uncertainty was appropriately assessed through use of probabilistic sensitivity analyses. As a main limitation to their study, the authors reported that they included hip, vertebral and wrist fractures and excluded all others. Some components of the reporting were lacking in detail, but generally the analysis seemed comprehensive.

Concluding remarks:
Overall quality of the study methodology was good. Some elements were not reported in sufficient detail to make a full assessment, but the authors’ conclusions appear appropriate given the analysis undertaken.

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