Osteoporosis prevention and treatment in elderly men—a cost-effective strategy

Original article Schousboe JT *et al.* (2007) Cost-effectiveness of bone densitometry followed by treatment of osteoporosis in older men. *JAMA* **298:** 629–637

SYNOPSIS

KEYWORDS bisphosphonate, cost-effectiveness, fracture, men, osteoporosis

BACKGROUND

Guidelines on diagnosis and management of osteoporosis in men are hampered by insufficient evidence-based, cost-effectiveness analyses.

OBJECTIVE

To determine the benefits and lifetime costs of bone densitometry followed by 5 years' treatment with oral bisphosphonates to prevent fracture in elderly men with osteoporosis.

DESIGN AND INTERVENTION

The authors constructed a Markov microsimulation cost–utility model from previously published data that compared intervention with no intervention for the prevention of osteoporotic fractures in elderly men. The model assessed seven health states: no fracture; post-clinical vertebral fracture; post-radiographic vertebral fracture; post-hip fracture; post-hip and vertebral fracture; post-other fractures; and death. Transition between these states was assessed every 3 months. Background mortality was derived from the 2003 US vital statistics. The year 1 mortality after hip fracture was estimated to be 1.375 times that of the background mortality. By contrast, no excess mortality was assumed for vertebral or other non-hip fractures. The probability of each fracture type was estimated as a function of age, femoral neck T-score ≤–2.5, and treatment with bisphosphonates. The incidence rate of radiographic vertebral fracture was assumed to be 1.86 times that of clinical vertebral fracture. The yearly cost of oral bisphosphonates was at the 2004 wholesale price of US$1,000. Medication adherence was assumed to be 85% in the first 3 months and 55% by year 5. The cost of one yearly physician visit was estimated to be $52. The cost of bone densitometry was at the 2007 Medicare reimbursement rate of $82.

OUTCOME MEASURE

The main outcome measure was the cost per quality-adjusted life-year (QALY) gained with intervention versus no intervention.

RESULTS

The prevalence of osteoporosis among men with a previous fracture was 14.5% at age 65 years and 33.6% at age 85 years. By contrast, the prevalence in the absence of previous fracture was 7.6% and 17.6% in men aged 65 and 85 years, respectively. Intervention reduced the 10-year incidence by 2.1% for 65-year-old men without previous fracture and by 4.5% for 85-year-old men with previous fracture. The costs per QALY gained were <$50,000 for men aged ≥65 years with previous fracture and for men aged 80–85 years without previous fracture. The costs per QALY gained were influenced by the yearly cost of bisphosphonates. At a yearly cost of $1,000, the cost per QALY gained for a 70-year-old man without previous fracture was $70,000; however, if the yearly cost was reduced to $500, the cost per QALY gained was <$50,000. Societal willingness to pay for intervention and the use of a more-stringent definition of osteoporosis (T-score –3) also reduced the costs per QALY gained.

CONCLUSION

Bone densitometry followed by 5 years' oral bisphosphonate therapy was a cost-effective strategy for men aged ≥65 years with previous fracture and for men aged 80–85 years without previous fracture.

COMMENTARY

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The article by Schousboe *et al.* clarifies that osteoporosis prevention and treatment is as cost-effective in men as it is in women. The importance of this finding is that whereas 20–30% of women with osteoporosis are appropriately treated to reduce their risk of first or subsequent fracture, only 5–10% of men are treated similarly. This internationally consistent failure of therapeutic effort occurs despite evidence that men have an appreciable osteoporotic fracture risk: about 1 in 3 older men (aged >60 years) compared with 1 in 2 older women. Subsequent fracture risk in men increases approximately 4-fold after an osteoporotic fracture. This rate is comparable to that of age-matched women who have suffered an osteoporotic fracture, or to 20 years of aging.[1] In addition, the increase in mortality risk after osteoporotic fracture (including hip fracture) is greater in men than in women.[2] These findings are true for virtually all types of osteoporotic fractures (i.e. any fracture associated with minimal antecedent trauma).

Evidence on response to osteoporosis treatment in men is limited. Studies in men have largely used osteoporosis response surrogates, such as bone turnover markers and BMD. Although these outcomes have been comparable to those in postmenopausal women, the pivotal fracture end-point studies that have demonstrated efficacy in postmenopausal women are largely lacking in men. A study of teriparatide in men did show fracture reduction efficacy.[3] In addition, a study of zoledronic acid administered after one hip fracture showed a marked reduction in all clinical osteoporotic fractures in both men and women; however, the data were presented without any statement on sex-based differences in treatment response.[4] Of particular interest in this study was the appreciable reduction in mortality with bisphosphonate treatment. Whether this result was attributable to a change in overall fracture rate is not clear as only clinical fractures were studied and there was no analysis of vertebral deformities, which have been associated with mortality risk in other studies.

A major difficulty in assessing the potential cost-effectiveness of osteoporosis therapy has been the issue of assigning absolute osteoporotic fracture risk values. The Dubbo Osteoporosis Epidemiology Study[5] has allowed development of nomograms for estimation of absolute fracture risk. The WHO model, which uses data from a number of different epidemiological studies, is expected to be published shortly and will be particularly valuable when it is developed for men.

Men have been overlooked even more than women in prevention and treatment of osteoporosis. Current evidence—which suggests that specific agents are effective in reducing osteoporotic fracture risk in men as well as in women—is largely based on surrogate end points. Some data suggest reductions in mortality might be associated with preventative therapy and that such intervention is cost-effective. Osteoporosis in men is a much larger problem than is usually recognized clinically. The initial osteoporotic fracture risk is significant, and is associated with both a relatively higher subsequent fracture risk and increased post-fracture mortality. The findings of Schousboe *et al.* strengthen the imperative to prevent and treat osteoporosis in men.

References

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Competing interests
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PRACTICE POINT
Although men are less susceptible to osteoporosis than women, prevention and treatment should be a high clinical priority in men as they do worse clinically, with an increased risk of subsequent fracture and higher post-fracture mortality