Bruk av alendronat ved osteoporose: er det kostnadseffektivt? [Use of alendronate in osteoporosis: is it cost-effective?]
Kristiansen I S, Falch J A, Andersen L, Aursnes I

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.

Health technology
The use of alendronate in the treatment of osteoporosis.

Type of intervention
Treatment, primary prevention and secondary prevention.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
Women with a bone mass density (BMD) less than 2.5 standard deviations below maximum BMD (the WHO definition of osteoporosis) over the age of 65.

Setting
The setting was the community. The economic study was carried out in Norway.

Dates to which data relate
Effectiveness data were based on publications from 1994 and 1995 and prices were from 1994. The year for the resource use estimates was not reported.

Source of effectiveness data
Two previous clinical trials were reviewed for the effect estimate of alendronate. The effect estimate used in this paper was, however, assumed to be lower than that in the trials. Effectiveness was therefore based both on trial evidence and on an authors' assumption.

Modelling
A Markov model was used to synthesise cost-effectiveness and cost-utility estimates.

Outcomes assessed in the review
Hip fractures and mortality were the outcomes used in the model.

Study designs and other criteria for inclusion in the review
Not reported.
Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
The effect estimate was based on the review of two studies reporting randomised clinical trials.

Methods of combining primary studies
The results of the primary studies were not combined.

Investigation of differences between primary studies
Differences were not reported or investigated.

Results of the review
The risk of hip fracture was assumed to be 45% after five years of treatment with alendronate.

Methods used to derive estimates of effectiveness
Both literature review and assumptions were used to derive estimates of the effectiveness of alendronate and the duration of effect after cessation of therapy.

Estimates of effectiveness and key assumptions
The baseline risk of hip fracture in an untreated population was taken from a population-based cohort. The authors assumed that 20% of patients die within the first year after a hip fracture, 30% of this mortality was assigned to the hip fracture. The effectiveness of 45% risk reduction was assumed to be achieved through a process of gradual increase over two treatment years. Fracture risk was assumed to increase gradually back to normal over a period of ten years after cessation of the medication. Treatment was for five years.

Measure of benefits used in the economic analysis
Hip fractures avoided, life-years gained and quality-adjusted life years (QALYs) gained were the primary measures of benefit in the economic analysis. Quality of life for patients with hip fracture was estimated at 0.8. This estimate was based on an interview with 11 patients with hip fracture using the 15-D instrument. The model also took account of the incidence of vertebral fractures and wrist fractures. The quality of life for these health states was also estimated through the use of 15-with ten patients with each condition.

Direct costs
The cost per year for alendronate medication was estimated at Nok 4,313. The authors assumed that patients would require three GP consultations in the first year and one in subsequent years at a cost of Nok 253 per consultation. Bone mass density measurements and biochemical tests were assumed to take place biannually at a cost of Nok 298 and Nok 350, respectively. Treatment costs were reduced by 10% in the second to fifth year due to clinical trial data showing a reduction of patient compliance with therapy in subsequent years. Costs in the first year after hip fracture were based...
on hospital data and interviews with orthopaedists, and were estimated at Nok 166,000.

Costs for avoided fractures (average of Nok 5,630) were subtracted from treatment costs. Future costs were discounted at 7%. The price year was 1994.

**Statistical analysis of costs**
No statistical analysis was reported.

**Indirect Costs**
No indirect costs were included.

**Currency**
Norwegian Kroner (Nok).

**Sensitivity analysis**
A sensitivity analysis was carried out incorporating a range of bone mass densities, risk reduction estimates, duration of effect after cessation of therapy, quality of life after hip fracture, discount rate, yearly medication costs, costs of hip fracture and the impact of bone mass density on the risk of hip fracture. One-way sensitivity analysis was conducted, exploring 'best case' and 'worst case' scenarios. For example, worst case scenario for the effectiveness estimate was a 30% reduction rate, whereas the best case scenario was a 60% risk reduction.

**Estimated benefits used in the economic analysis**
On average, each woman avoided 0.026 hip fractures, 0.048 vertebral fractures and 0.043 wrist fractures over a lifetime. On average, each woman gained 0.0246 life years and 0.1069 QALYs. The benefit of no intervention was assumed to be zero.

**Cost results**
The cost of five years of treatment with alendronate was Nok 19,958 after discounting. This was reduced to Nok 14,329 after subtracting the costs of avoided fractures. The cost of no intervention was assumed to be zero.

These findings were sensitive to changes in treatment effect and duration, discount rate, future risk of fractures and the assumption of reduced quality of life during treatment, but were not sensitive to changes in the costs of treating a hip fracture. For example, the cost per QALY gained increased to Nok 489,000 assuming only 30% treatment risk reduction, and dropped to Nok 109,000 if the medication costs were halved.

**Authors' conclusions**
The authors concluded that the cost-effectiveness of the use of alendronate amongst women with a high risk of hip fracture was in the region of cholesterol-lowering interventions and anti-hypertensive treatment.

**CRD COMMENTARY - Selection of comparators**
No justification was provided for the comparison with no treatment and it may have little relevance to health care decision-makers. Other treatments for osteoporosis (for example etidronate) were on the market when this study was
conducted. An incremental analysis, for example comparing these treatments, could have had more relevance to clinical decision-makers.

Validity of estimate of measure of effectiveness
The estimate was derived from assumptions based on the results from two clinical trials. As this study was based on more than one clinical trial it is not clear if other relevant literature would have been uncovered if a systematic review of the literature had been undertaken. The authors did not state explicitly why they use a risk reduction estimate of 45% in the model, an estimate that was more conservative than the estimates from the trials. The authors did not provide any information on the patient case-mix in the trials, information that would have been useful to readers of this abstract when trying to assess the relevance of the study in their own setting. Effectiveness measures were evaluated appropriately in the sensitivity analysis.

Validity of estimate of measure of benefit
The authors derived utilities from a patient sample, and other health economists may disagree with this. The authors subsequently adjusted the results by increasing the quality of life in the three different health states from the patient survey so that the overall estimate of QALYs gained was more conservative than it otherwise would have been. The results of the analysis did not however change much when exploring cost/QALY over a range of +10% and -10% to the quality of life estimate.

Validity of estimate of costs
Costs and quantities were reported separately, which facilitates a judgement of relevance in other clinical settings. There was also a reference to a more detailed publication on the costing methods (also in Norwegian). The authors subtracted costs for avoided fractures in their estimate of treatment costs, and this may be controversial involving, as it does, double-counting of benefits in both numerator and denominator. The authors point out that gastrointestinal side effects may occur during treatment with alendronate, but they omitted an assessment of the resource implications of this side effect.

Implications of the study
The authors concluded that there may be significant health gains associated with the treatment of osteoporosis at a reasonable cost and recommended the targeting of women with high risk of fracture.

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Bibliographic details

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Other publications of related interest
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