Cost-effectiveness analysis of a quality-controlled mammography screening program from the Swiss statutory health-care perspective: quantitative assessment of the most influential factors

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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 primary objective of the study was to determine the cost-effectiveness of a mammography screening programme (MSP) aimed at reducing breast cancer, compared with an established opportunistic screening programme, in Switzerland. The authors concluded that the MSP was a cost-effective strategy, but it seems that there is high uncertainty around the findings. Overall, the study was carried out satisfactorily, with good reporting of the methods and results.

Type of economic evaluation

Cost-effectiveness analysis

Study objective

The primary objective of the study was to determine the cost-effectiveness of a mammography screening programme (MSP) aimed at reducing breast cancer (BC), compared with an established opportunistic screening programme (OSP), in Switzerland. A secondary aim of the study was to identify the major factors influencing the cost-effectiveness results.

Interventions

The interventions under examination were a biennial quality-assured MSP and a biennial OSP programme for the detection of BC in women at a predefined baseline age (40, 50, 60 or 70 years). It was assumed that the participation rate was 70% for the MSP and 20% for the OSP.

Location/setting

Switzerland/primary care.

Methods

Analytical approach:

A Markov model was constructed and populated with published evidence in order to determine the costs and benefits associated with the two strategies. A lifetime horizon was considered in the analysis. The authors stated that the perspective of a Swiss third-party payer was adopted.

Effectiveness data:

The clinical estimates were derived from studies identified through a systematic search of the literature, the methods and conduct of which were described. MEDLINE was used to identify the primary sources. Clinical studies of different design, meta-analyses and published reviews were included in the analysis in order to estimate the transition probabilities of the Markov model. The key model input was the reduction in BC mortality associated with the MSP.

Monetary benefit and utility valuations:

None.

Measure of benefit:

The summary benefit measure was the life-years gained (LYG). These were estimated using the decision model. Other model outcomes were total mortality and the number-needed-to-screen (NNS) to avoid one death over 10 years. The

LYG were discounted at an annual rate of 1.5% (undiscounted results were also computed), while the other outcomes were not discounted.

Cost data:
The three main categories in the analysis of the costs were costs of mammography examinations, costs of further diagnostic evaluation for mammograms interpreted as positive, and costs of treatment for BC. Annual follow-up costs after being treated for BC were also included. The estimation of the costs and quantities associated with screening was based on Swiss data, while international sources were used to calculate the treatment and follow-up costs of BC care. The calculation of the costs took into account the possible co-payments borne by patients. The price year was 2004 (an annual inflation rate of 1.4% was applied) and prices were expressed in US dollars ($). The long-term costs were discounted at annual rates of 3% (undiscounted results were also presented).

Analysis of uncertainty:
The issue of uncertainty was addressed by means of both univariate deterministic and probabilistic sensitivity analyses. The authors stated that plausible ranges of values were considered. Most of these values were derived from the literature.

Results

In women aged 40 years, the total costs were $4,366 with the MSP and $2,802 with the OSP. The mean life expectancy would be 30.674 years with the MSP and 30.652 with the OSP. The incremental cost per LYG with the MSP over the OSP was $73,018.

In women aged 50 years, the additional cost and survival associated with the MSP over the OSP were, respectively, $1,473 and 0.02 years. This resulted in an incremental cost per LYG of $75,602.

In women aged 60 years, the additional cost and survival associated with the MSP over the OSP were, respectively, $1,253 and 0.014 years. This resulted in an incremental cost per LYG of $90,635.

In women aged 70 years, the additional cost and survival associated with the MSP over the OSP were, respectively, $966 and 0.008 years. This resulted in an incremental cost per LYG of $118,193.

The sensitivity analysis revealed that the most influential parameters of the model were BC mortality, incidence of BC, cost of initial tumour treatment, and other costs such as biopsy or the MSP. The probabilistic sensitivity analysis showed that the incremental cost per LYG for the MSP over the OSP ranged from $45,000 to $135,000.

Authors' conclusions

The authors concluded that, in Switzerland, the MSP was a cost-effective strategy in comparison with the OSP for reducing the incidence of BC. Both the incidence of BC and BC mortality played a key role in the economic outcome.

CRD commentary

Interventions:
The rationale for the choice of the comparators was clear. The new screening programme (i.e. the MSP) was compared with a conservative approach (i.e. the OSP). The two strategies were clearly described and assumptions on participation rate were made.

Effectiveness/benefits:
The identification of clinical estimates used in the model was based on a systematic review of the literature. No specific inclusion criteria for the design of the primary studies were used, thus evidence from multiple sources was derived. Whenever possible, Swiss data were used in the model. Wide ranges of values were considered in the sensitivity analysis in order to take account of variability in the clinical parameters. The use of LYG was appropriate and relevant for the disease under examination. As the authors pointed out, the inclusion of quality-of-life estimates would have been interesting, but no data were available.

Costs:

The analysis of the costs was consistent with the authors' stated perspective. The unit costs and quantities of resources used were not presented separately given the specific accounting system used in the authors' setting. The sources of the data were reported, and alternative ranges of values were considered in the sensitivity analysis. Discounting was relevant and was appropriately performed. The price year was reported, which will simplify reflation exercises in other time periods.

Analysis and results:
The costs and benefits were appropriately synthesised. The results of both the base-case and sensitivity analyses were extensively reported for all age cohorts. This transparent reporting enhances the transferability of the study. The decision model was described, as was the process used to validate it. The use of a probabilistic analysis enhances the quality of the study. The authors acknowledged some limitations of the analysis. These mainly related to the lack of Swiss data, especially for the OSP, and the missing quality-of-life outcomes, which were not calculated because of the lack of population-based published evidence in this field. Finally, it should be noted that, although the authors stated that the MPS can be considered a cost-effective option, its incremental cost per LYG was higher than $100,000 for the cohort of women aged older than 70 years and between $50,000 and $100,000 for the other age groups.

Concluding remarks:
The study was satisfactorily performed and both the methods and results were extensively reported. The authors concluded that the MPS is a cost-effective strategy, but study results suggest that it should be considered a borderline option.

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Bibliographic details
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Other publications of related interest
Mandelblatt J, Saha S, Teutsch S, et al. The cost-effectiveness of screening mammography beyond age 65 years: a systematic review for the U.S. Preventive Services Task Force. Ann Intern Med 2003;139:835–42.

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