Cost effectiveness of shortening screening interval or extending age range of NHS breast screening programme: computer simulation study
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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.

Health technology
Screening strategy for breast cancer.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
Women from the North West health region of England who were invited to be screened for breast cancer.

Setting
Hospital/primary care. The study was carried out in the North West health region of England.

Dates to which data relate
The effectiveness data were retrieved from studies previously published between 1990 and 1996. The price year was not stated.

Source of effectiveness data
Review of previously published studies.

Modelling
A computer simulation model was used which simulates life histories for women in the absence of a screening programme for breast cancer and then assesses how these life histories would change as a consequence of introducing different screening policies.

Outcomes assessed in the review
The following outcomes were assessed in the review: the pre-clinical screen detectable period, the sensitivity of the screening test, the pre-screening stage distribution, and stage and age-specific survival rates.

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

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

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

Number of primary studies included
Approximately 4 studies were included in the review.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
The mean pre-clinical screen detectable period varied from 1.8 years at age 35 to 6.2 years at age 70. The sensitivity of the screening test for women aged over 50 was assumed to be 0.4, 0.65, 0.8, 0.9, and 0.95 for in situ disease, T1a, T1b, T1c, and T2+ tumours, respectively. The pre-screening stage distribution in women aged 50-69 at diagnosis was assumed to be 4.6% in situ, 1.5% T1a, 6.3% T1b, 32.6% T1c, and 55% T2+. Survival rates for women aged 50-59 and women aged 60-69 were assumed to be 67% and 69%, respectively.

Measure of benefits used in the economic analysis
The measures of benefit used were the number of deaths prevented and life years gained. Benefits were discounted at 6%.

Direct costs
Costs were discounted at 6%. Quantities and costs were not reported separately. The direct costs included the costs of screening, diagnosis, primary treatment, adjuvant therapy, follow-up and advanced disease. The quantity/cost boundary adopted was that of the provider of the screening programme in its constituent parts (hospital, the screening organisation and GP practices). The estimation of quantities and costs was based on actual data. Costs were derived from various sources, but primarily from the Christie Hospital NHS Trust in Manchester.

Statistical analysis of costs
Not reported.

Indirect Costs
Not included.

Currency
UK pounds sterling (£).
Sensitivity analysis
Not reported in this paper but correspondence from the author indicates that sensitivity analysis is reported elsewhere, the details of which are outlined in the paper (reference 5).

Estimated benefits used in the economic analysis
The current screening programme reduced mortality by 12.8%, preventing 4,079 deaths over 27 years. Screening to age 69 reduced mortality by 16.4%, preventing 5,311 deaths over 27 years. A screening interval of two years reduced mortality by 15.3%, preventing 4,880 deaths. The current screening programme generated 66,187 life years gained or 12,251 life years discounted at 6%. Screening to age 69 generated 78,221 life years gained or 15,161 life years discounted to present values. A screening interval of two years generated 81,322 life years gained or 14,987 life years discounted at 6%.

Cost results
The cost of the current programme is 30.9 million. This increases to 39.6 million if the age range of the programme is extended and to 40.6 million if the screening interval is reduced.

Synthesis of costs and benefits
The cost of a life year gained is 2,522 in the current programme, 2,611 if the age range of the programme is extended, and 2,709 if the screening interval is shortened. The marginal cost per life year saved of extending the age range is 2,990 and of shortening the screening interval is 3,545. The sensitivity analysis showed that the findings were not affected by using upper and lower estimates of the costs of screening, diagnosis, and treatment or by varying the discount rate of costs and benefits.

Authors' conclusions
Substantial mortality reductions will follow from extending the age range screened or reducing the screening interval. The computer model predicted that the difference between extending the age range screened or reducing the screening interval from three to two years is so small that either could be chosen.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear.

Validity of estimate of measure of benefit
The measure of benefit seems to be valid. The authors acknowledged that the choice of policy depends on the outcome measure chosen, i.e. number of deaths prevented or life years gained.

Validity of estimate of costs
Direct costs for the hospital, the screening organisation and the costs to GP practices were included.

Other issues
Since extensive details were not provided of the demographic characteristics of the populations screened, the effectiveness data and the costing methods, it is not possible to assess the generalisability of the results to other settings or countries.

Implications of the study
The policy for a national breast screening programme, as confirmed by the authors, should ideally be based on a randomized controlled trial where feasible to do so. However, within the well accepted limitations of computer simulations the modelled solution presented here offers a comprehensive analysis of the likely outcomes of shortening the screening interval or extending the age range of the NHS screening programme.
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