In search of the best upper age limit for breast cancer screening
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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
Breast cancer screening for different age categories.

Type of intervention
Screening.

Economic study type
Cost-utility analysis.

Study population
Women undergoing breast cancer screening.

Setting
Hospital. The economic study was carried out in Rotterdam, the Netherlands.

Dates to which data relate
The main effectiveness data were extracted from previously published and unpublished studies from the period 1977 to 1991. Resource use and cost data were not reported, but were taken from a study published in 1991. The price year was 1990.

Source of effectiveness data
Effectiveness data were derived from a review of previously published studies.

Modelling
A MISCAN model was used to represent the natural history of breast cancer and the effects of screening. The disease model was reported to be based on a three-stage division of the development of invasive breast cancer in which the stage reflects tumour size. Optimistic and pessimistic assumptions concerning the improvement of prognosis due to screen-detection and duration of the period of mammographic detectability have been used. The optimistic variant assumes no further increase in pre-clinical duration after the age of 65 years and the pessimistic variant assumes a further increase in pre-clinical duration with age which is extrapolated from the trend in younger age groups.

Outcomes assessed in the review
The outcome assessed were the estimates for incidence of cancer.

Study designs and other criteria for inclusion in the review
No specific study design were stipulated by the authors as inclusion criteria.

**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**
The authors reviewed 4 studies in total. A sub-total of 2 were used as the sources of effectiveness.

**Methods of combining primary studies**
Narrative method.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The ratios of detection rate at prevalence screening and incidence rate in the situation without screening (study conducted in 1988) were 1.8 (incidence in control group: 1.9), 3.5 (incidence in control group: 3.0), 4.7 (incidence control group: 3.8) and 4.4 (incidence control group: 5.4) in the age classes 40-49, 50-59, 60-69 and 70-74, respectively. The corresponding figures derived from a study conducted in 1977 were 3.0 (ages 40-44), 3.8 (ages 45-49), 3.3 (ages 50-54), 4.0 (ages 55-59), 3.6 (ages 60-64) and 4.7 (ages 65-74). The corresponding figures derived from a trial with unpublished data were 1.0 (ages 40-44), 2.5 (ages 45-49), 2.8 (ages 50-54), 2.4 (ages 55-59), 2.5 (ages 60-64), 7.2 (ages 65-69), 3.0 (ages 70-74), 4.0 (ages 75-79) and 3.4 (ages 80-84). The values adopted for the optimistic variant were 2.0 (ages 50-54), 2.3 (ages 55-59), 2.8 (ages 60-64), 3.4 (ages 65-69), 3.6 (ages 70-74), 3.9 (ages 75-79), and 4.0 (ages 80-84). The corresponding values for the pessimistic variant were 2.0, 2.3, 2.8, 3.4, 4.6, 6.0, and 8.4 respectively.

**Methods used to derive estimates of effectiveness**
Effectiveness estimates were also derived from the authors' assumptions.

**Estimates of effectiveness and key assumptions**
For demonstration purposes, an attendance rate was assumed to be 100%. For calculating cost-effectiveness ratios, attendance rates were from 75% at age 51 years, to 61% at age 71 years and 21% at age 81 years.

**Measure of benefits used in the economic analysis**
The benefit measure was quality-adjusted life years (QALYs) gained. Clinicians' values were used to assess the health states. The valuation tool used was not stated.

**Direct costs**
Costs were discounted. Quantities were not analysed separately from costs. Cost items were not reported separately. Social costs of the primary process of screening, changes in diagnostic procedures, primary therapies, follow-up after treatment, metastatic disease, and terminal illness were included in the analysis. The cost data were taken from a previously published study. The cost boundary adopted was that of society. 1990 price data were used.

**Indirect Costs**
Not considered.

**Currency**
Dutch guilders (Dfl). A conversion of Dfl2.7 = 1 (1990) was made.

**Sensitivity analysis**
One-way sensitivity analysis was performed by changing the assumption on improvement of prognosis due to screening at age over 70 years.

**Estimated benefits used in the economic analysis**
The number of life-years gained (*1000) for 69, 79, 89 and 99 years of upper age limit were estimated to be 408, 480, 494 and 497 under the optimistic variant and 395, 476, 496 and 497 under the pessimistic variant. The QALYs for the basic model were plotted against last screening age for years over 70, but the figures were not given in detail. The numbers of QALYs gained (discounted at 5%) for the 69 and 99 year upper age limits, assuming no improvement of prognosis due to screening at age over 70, were estimated to be 62,727 and 57,855 respectively.

**Cost results**
Not reported.

**Synthesis of costs and benefits**
The marginal cost-effectiveness ratio (CER) in the pessimistic variant of extending a programme from a last age of invitation of 69 years to a last invitation at 75 years was 8,400 per QALY gained. This was reported to be approximately the same ratio which resulted from intensifying the invitation scheme in the age group 50-70 years old. Further extension to age 79 years was shown to have a marginal CER of 36,000 per QALY gained.

**Authors' conclusions**
Under pessimistic assumptions, the balance between positive and negative effects of screening remains favourable up to an age of around 80 years. Under optimistic assumptions, this balance never becomes clearly negative with increase of the upper age limit of a screening programme.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of comparator is clear.

**Validity of estimate of measure of benefit**
The estimate of measure of benefit used in the economic analysis can not be guaranteed given the apparent lack of a comprehensive literature review and critical assessment of the primary studies included in the review.

**Validity of estimate of costs**
Quantities were not analysed separately from costs and insufficient detail of the methods of cost estimation was provided. The authors limited the source of cost data to one previously published study.
Other issues
The issue of generalisability to other settings or countries (USA, UK and Sweden) was addressed and appropriate comparisons were made with other studies in terms of results from screening projects. The results were not presented selectively. However, as a comprehensive sensitivity analysis was not conducted the results need to be treated with some caution.

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