The costs of treating breast cancer in the United Kingdom: implications for 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
Screening for breast cancer.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The treatment cost analysis was based on the case notes of 137 breast cancer patients. 102 patients had stage 1 cancer, 13 stage 2, 16 stage 3 and 6 had stage 4 cancer. This information was used to determine the screening scenario for the 2,687 new breast cancer registrations in the Trent region. The hypothetical no screening cohort was considered to be equal in size.

Setting
The practice setting was not specified. However, the secondary care sector seems likely. The economic analysis was undertaken in Nottingham University.

Dates to which data relate
Data for effectiveness and resource use were collected from 1991 for a period of 4 years. 1991 prices were used.

Source of effectiveness data
Evidence for the final outcome was derived from a single study.

Link between effectiveness and cost data
Retrospective costing was conducted on the same patient sample as that used in the effectiveness study.

Study sample
No power calculations were given to determine sample size. Instead an initial sample of 200 breast cancer patients were drawn at random from the Trent Registry. The case notes of 137 patients were analysed since 63 patients were excluded due to missing notes, incorrect diagnosis or insufficient information.

Study design
The study undertaken was a retrospective cohort study. The study appears to be a multi-centred trial within the Trent
Region. Patients were followed up for 4 years.

**Analysis of effectiveness**
The analysis of the clinical study was based on intention to treat. The primary health outcome was life-years gained. The screening group was compared to a hypothetical group of controls who were not screened.

**Effectiveness results**
For breast cancer stages 1 and 2, the authors' survival estimates were 10.9 and 5.9 years respectively. Life expectancy for patients with stage 3 and 4 breast cancer were pooled due to small sample size and this resulted in an estimate of 2.3 years. The distribution of breast cancer was based on the proportions found in the study sample, that is 74%, 10%, 12% and 4% for stages 1 to four respectively. For the no screening scenario, the presentation of breast cancer was taken to mirror the staging distribution of the sub-sample of cancers not detected through screening in the authors study sample.

**Clinical conclusions**
The authors found that the effect of incidence screening was to improve the staging distribution at diagnosis, with no effect on cancer yield. Expected life-years gained were estimated to be higher for the stage one group and lower for the stages two to four group in the screened as compared to the hypothetical no-screening group.

**Modelling**
Modelling was used to extend the life year estimates of the trial population beyond the 4 year follow-up period. The authors fitted a simple linear trend through the survival data of the sample to obtain a mean life expectancy following treatment.

**Measure of benefits used in the economic analysis**
Life-years gained were used in the economic analysis. Modelling was used to extrapolate results beyond the four years of follow-up. Health states were measured directly and were assessed by the various clinicians.

**Direct costs**
All costs were discounted at 6%. Costs were broken down by stage but quantities of resources used were not specified. The costs measured included health care costs (diagnosis, treatment, follow-up and palliative care). Tests were conducted to analyse the effect of including private costs on the estimated expected lifetime costs. Hence, both a health service and a patient perspective were adopted. Quantities and costs were based on actual data. Unit costs for each unit during diagnosis, treatment and follow-up were taken from published estimates or from the finance departments of the 8 service providers in the Region. 1991 prices were used.

**Statistical analysis of costs**
Total costs were reported at 95% confidence intervals.

**Indirect Costs**
Not included.

**Currency**
UK pounds Sterling (£).
Sensitivity analysis
One-way sensitivity analysis of screening estimates was carried out on the discount rate, the one year reduced survival for stages 1 and 2, and lower and upper confidence intervals of base costs. Additionally, within the model, the distribution of cancer stages occasioned by screening was altered. Also the effect of private costs was incorporated within the overall analysis. Areas of uncertainty investigated were variability in data, generalisability of results and extrapolation from primary data sources to make the results more comprehensive.

Estimated benefits used in the economic analysis
The incremental life-years gained by screening in Trent were calculated as 1,263, -130, -250 and -63 by stage from 1 to 4. The total incremental benefits were 820 estimated life-years gained through screening.

Cost results
The incremental cost by stage was estimated as 773,872, -118,798, -420,942 and -177,071 for 1991. The total incremental costs reported for screening were 2,880,158.

Synthesis of costs and benefits
The incremental cost per life-year gained through screening was 3,511 (1991) and the discount rate was 6%. Re-estimation of the model on the basis of staging distribution of the Southampton and the Texas studies resulted in a fall in the cost per life-year gained for screening to 1,365 for the first study and 1,141 for the latter study. If private costs were included, the original model estimate was revised upwards to a cost per life-year gained from screening of 4,266.

Authors' conclusions
The authors concluded that the breast cancer screening programme would probably not provide significant treatment cost economies. Whilst late-stage breast cancer patients were estimated to consume relatively large amounts of palliation resources, counter to this, early stage patients consumed more of the surgical and follow-up costs. It is suggested that the cost-effectiveness ratio of breast cancer screening is better than originally thought.

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

Validity of estimate of measure of benefit
The estimate of the benefit is likely to be internally valid.

Validity of estimate of costs
Sufficient detail was provided of the source and nature of costs.

Other issues
This study was well conducted. Appropriate comparisons were made with other studies and results are unlikely to have been presented selectively. Generalisability of the results to other settings may be difficult due to treatment and cost variations for example.

Source of funding
Research forms part of a program of investigations into the costs of cancer funded by NHS Trent.

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