Life-long screening of patients with intermediate-thickness cutaneous melanoma for asymptomatic pulmonary recurrences: a cost-effectiveness analysis

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
Life-long screening of patients with intermediate thickness cutaneous melanoma for asymptomatic pulmonary recurrences.

Type of intervention
Primary prevention.

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

Study population
A hypothetical cohort of patients with intermediate thickness cutaneous melanoma.

Setting
Hospital. The economic study was set in the USA.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1984 and 1996. Cost data were collected from studies published between 1988 and 1995. The price year was 1996.

Source of effectiveness data
Effectiveness data were derived from a review of the literature.

Modelling
A Markov decision analytic model was used to determine the cost-effectiveness and cost-utility of a life-long screening programme.

Outcomes assessed in the review
The review assessed the following outcomes: additional months of life for surgical patients, sensitivity and specificity of the CXR screening programme, morbidity and mortality of thoracotomy, probability of first recurrence, proportion of systemic recurrences, proportion of asymptomatic lung recurrences, and health utilities.

Study designs and other criteria for inclusion in the review
Effectiveness estimates were collected from a historic cohort at Roswell Park Cancer Institute and other published
reports, and new cases of melanoma in 1996 from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) programme.

**Sources searched to identify primary studies**
MEDLINE was searched to identify primary studies.

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

**Methods used to judge relevance and validity, and for extracting data**
Summary statistics from individual studies were used.

**Number of primary studies included**
Not reported.

**Methods of combining primary studies**
First recurrence probabilities were based on Kaplan-Meier analysis. Probabilities of recurrence were based on weighted averages of the recurrence probabilities and associated variances for subgroups under each stage. Other estimates were based on averages.

**Investigation of differences between primary studies**
The authors examined study designs and participants of primary studies.

**Results of the review**
The number of additional months of life expectancy for surgical patients was 8.

The sensitivity and specificity of the CXR screening programme were 54% and 97%, respectively.

55% of detected cases were amenable to surgery. The morbidity of thoracotomy was 1 month and the mortality rate was 1%.

1% of cases were lost to follow-up annually.

The annual probability of first recurrence ranged between 0.5% and 12.9%.

The proportion of systemic recurrences varied between 6% and 47%.

The proportion of asymptomatic lung recurrences varied between 15% and 38%.

Health utilities were 0.9 for surgical patients with complete remission and 0.5 for patients with progressive disease.

**Measure of benefits used in the economic analysis**
The number of additional months of life for surgical patients, non-quality-adjusted life years (NQALYs) and quality-adjusted life years (QALYs) were used as the measures of benefit. Benefits were discounted at an annual rate of 5% and were also reported discounted at 0% and 3%.

**Direct costs**
Direct costs were discounted at an annual rate of 5%, based on the average annual Treasury Bill rate from 1990-1992.
Quantities and costs were reported separately. Direct costs included the cost of the CXR, treatment (surgery), evaluation of false-positive CXRs, and the morbidity and mortality associated with surgery. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Cost estimates were taken from published studies. Costs were inflated to 1996 dollars, using the annual rates of the non-seasonally adjusted Medical Care Services Consumer Price Index from the US Bureau of Labor.

**Indirect Costs**
Indirect costs were not included.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were conducted to evaluate the impact of each model parameter on the cost-effectiveness ratio for NQALY and QALY, using both discounted and undiscounted health benefits.

**Estimated benefits used in the economic analysis**
The 20-year programme saved 193 NQALYs and 175 QALYs using undiscounted health benefits. There were 4 premature deaths from a total of 339 thoracotomies.

**Cost results**
The 20-year programme cost $28.9 million.

**Synthesis of costs and benefits**
Cost-effectiveness ratios were $150,000 per NQALY and $165,000 per QALY using undiscounted health benefits and $199,000 per NQALY and $215,000 per QALY using discounted health benefits. Costs and benefits were reported at various programme lengths (5, 10 and 20 years), both discounted and undiscounted. The annual cost-effectiveness ratios were lowest in years 3-10. These results were most sensitive to changes in the recurrence probabilities, the incremental benefit in months of life saved, the cost of the CXR, and the specificity of the CXR screening programme.

**Authors' conclusions**
Even in the absence of certain benefits, the model demonstrated that significant cost savings may be possible by decreasing screening frequency in the first two years and limiting screening to the first 5-10 years after diagnosis.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the comparator used, namely the current situation of no screening. You, as a user of the database, should decide if this health technology is relevant to your setting.

**Validity of estimate of measure of benefit**
The authors did not state that a systematic review of the literature had been undertaken. The methodology and conduct of the review were satisfactorily reported. Effectiveness estimates were combined using narrative methods, Kaplan-Meier analysis, and arithmetic averages. Effectiveness estimates were derived credibly from primary studies. Health utilities were derived from those published elsewhere by oncology specialists and relate to other types of cancer. The estimation of benefits was obtained directly from the effectiveness analysis. Benefits were reported both discounted and undiscounted which is helpful when transferring the results to other settings and countries.
Validity of estimate of costs
All categories of costs relevant to the perspective adopted were included in the analysis. Costs associated with lost wages and increased health care services associated with any improvement in survival were not considered. Quantities and costs were reported separately. Sensitivity analyses were conducted on both quantities and costs. The price year and the conversion methods were reported. Cost results refer to the USA and care should be exercised when transferring these to other countries.

Other issues
The authors made appropriate comparisons of their findings with those from other studies. The issue of generalisability to other settings was not discussed. The authors did not present their results selectively. The study considered patients with intermediate thickness cutaneous melanoma, and this was reflected in the authors' conclusions. The authors suggested the use of modelling techniques to address questions regarding the use of other procedures for other cancer types.

Implications of the study
The authors suggested that significant cost savings may be possible by decreasing screening frequency in the first two years and limiting screening to the first 5-10 years after diagnosis.

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