Staging MR lymphangiography of the axilla for early breast cancer: cost-effectiveness analysis

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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
This study examined the cost-effectiveness of alternative axillary staging interventions for early breast cancer. The authors concluded that strategies based on magnetic resonance lymphangiography were more cost-effective than sentinel lymph node biopsy alone. The study was based on valid methodology and the authors’ conclusions appear to be appropriate given the limitations in the available data.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to compare the cost-effectiveness of three axillary staging strategies in postmenopausal women, aged 61 years, with clinically node-negative early breast cancer.

Interventions
The strategies were magnetic resonance (MR) lymphangiography alone, a combination of MR lymphangiography and sentinel lymph node (SLN) biopsy, and SLN biopsy alone. These were compared with a strategy of no staging, which was breast conservation without axillary staging.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The economic evaluation was based on a Markov model and the time horizon was the patients’ lifetime. The authors stated that a quasi-societal perspective was adopted.

Effectiveness data:
The effectiveness data were derived from the published literature. The main clinical parameters were the sensitivity and specificity of the procedures, the probability of metastatic breast cancer, and the mortality due to metastatic breast cancer and other causes. The sensitivity and specificity of MR lymphangiography were derived from pooled estimates from three trials. Some data assumptions were made and their details were clearly presented. The transition probabilities were estimated using a validated internet-based prediction tool for breast cancer-specific survival.

Monetary benefit and utility valuations:
The utility values were derived from published studies. Those associated with the time spent during adjuvant chemotherapy were based on health professionals’ valuations using a visual analogue scale. Patients’ preferences were assessed for the post-adjuvant therapy state by applying the standard gamble technique.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary measure of benefit.

Cost data:
The economic analysis included the costs of the procedures, breast conservation surgery, radiation and drug therapy,
and management after surgery and for metastatic breast cancer. These costs were derived either from the literature or official published sources, or were based on authors’ assumptions, which were fully reported. The costs were discounted at an annual rate of 3% and were reported for the price year 2006.

Analysis of uncertainty:
Uncertainty in the model parameters and assumptions was investigated through one- and two-way sensitivity analyses. All the input parameters were tested in one-way sensitivity analysis except for the cost of SLN biopsy alone. Two-way sensitivity analysis was conducted by varying the following pairs of parameters: MR lymphangiography sensitivity and specificity; and MR lymphangiography sensitivity and SLN sensitivity. In a separate analysis the impact of quality of life reduction due to SLN biopsy and axillary lymph node dissection was assessed.

Results
Total costs were $56,356 for no treatment, $61,605 for MR lymphangiography alone, $62,462 for SLN biopsy, and $63,582 for the combination strategy. The expected QALYs were 13.816 for no treatment, 13.957 for MR lymphangiography alone, 13.958 for SLN biopsy, and 13.970 for the combination strategy.

In the incremental analysis, SLN biopsy was weakly dominated due to its higher incremental cost-effectiveness ratio (ICER) relative to the combination strategy when compared with MR lymphangiography alone. When MR lymphangiography was compared with no treatment the ICER was $37,244 per QALY and when the combination strategy was compared with MR lymphangiography alone, the ICER was $153,007 per QALY.

One-way sensitivity analysis demonstrated that the results were robust to most of the parameter variations. The results were only sensitive to MR lymphangiography sensitivity. Two-way sensitivity analyses demonstrated that the results were sensitive to variation in the reduced quality of life due to SLN biopsy and axillary lymph dissection, with MR lymphangiography alone the preferred strategy at most values.

Authors’ conclusions
The authors concluded that MR lymphangiography-based strategies were most cost-effective compared with SLN biopsy alone for axillary staging of early breast cancer. They drew attention to the impact of the sensitivity of MR lymphangiography on the results and suggested that further research should be conducted on this.

CRD commentary
Interventions:
The authors justified their selection of the comparators, and the interventions were clearly reported. They were relevant to the US setting.

Effectiveness/benefits:
The details of the literature review, which identified the relevant sources of data, were not provided. Pooling of the estimates from published studies was carried out to obtain the primary estimates, and the justifications for this were briefly discussed. The authors highlighted the uncertainty around the estimation of some data, as a limitation of their analysis. The valuation methods, for the utility estimates from the literature, were reported. QALYs are a validated benefit measure appropriate for capturing the impact of the interventions on the quality of life and survival. They are generalisable, and facilitate decision-making across diseases.

Costs:
It appears, from the cost categories included, that the analysis was conducted from the perspective of the payer of the health care service. A full breakdown of cost items was not given and costs were only reported as macro-categories. The lack of transparency in the reporting of the cost details makes their validity difficult to assess. The price year, use of discounting, inflation adjustments, and assumptions were reported.

Analysis and results:
The costs and benefits were combined using an incremental approach, which was appropriate for generating a ranking of the optimal procedures. The issue of uncertainty was investigated using only a deterministic approach, but the results were reported adequately. The authors provided a balanced discussion on the limitations of their study, the
generalisability of the results, and the assumptions made.

Concluding remarks:
The study was based on valid methodology and the authors’ conclusions appear to be valid, despite some limitations in the available data.

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