An economic evaluation of docetaxel and paclitaxel regimens in metastatic breast cancer in the UK

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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 determined the cost-effectiveness of paclitaxel versus docetaxel treatment regimens for patients with metastatic breast cancer who had previously been treated with an anthracycline. The authors concluded that docetaxel was likely to be a cost-effective alternative to three-weekly, weekly, or nanoparticle albumin-bound paclitaxel from the perspective of the UK National Health Service. The study was well carried out and was satisfactorily reported, enhancing the validity of the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study determined the cost-effectiveness of paclitaxel versus docetaxel treatment regimens for patients with metastatic breast cancer, who had previously been treated with an anthracycline.

Interventions
The treatments were docetaxel 100mg/m² as a one-hour intravenous infusion every 21 days and paclitaxel 175mg/m² as a three-hour intravenous infusion every 21 days. Docetaxel was also compared with paclitaxel administered once every week and nanoparticle albumin-bound (nab) paclitaxel 260mg/m² every three weeks.

Location/setting
UK/hospital.

Methods
Analytical approach:
The analysis was based on a Markov model with a 10-year time horizon. The authors stated that the analysis was carried out from the perspective of the UK National Health Service (NHS).

Effectiveness data:
The clinical data on the efficacy and safety, for the main comparison, were from a randomised, open-label, controlled, multi-centre phase III trial (TAX 311) that directly compared docetaxel with three-weekly paclitaxel. Other data were identified through a review of the literature in electronic databases and abstracts of relevant clinical conferences. The clinical effect for weekly paclitaxel and nab-paclitaxel were also from randomised controlled trials (RCTs), with three-weekly paclitaxel as the common comparator. Some assumptions, based on expert opinion, were also required. The time to progression and time to death were the key clinical inputs and these were from the RCTs, extrapolated using statistical methods.

Monetary benefit and utility valuations:
The utility values were from published literature and some assumptions were also required.

Measure of benefit:
Quality-adjusted life-years (QALYs) and life-years (LYs) were the summary benefit measures. Both were discounted at an annual rate of 3.5%.
Cost data:
The economic analysis included the costs of drugs, their administration, premedication, secondary prophylactic and non-prophylactic use of granulocyte-colony stimulating factor (G-CSF) against febrile neutropenia, treatment of anaemia and other adverse events, and follow-up for progressive disease. The unit costs were based on official UK sources, such as the British National Formulary, NHS reference costs, a report from the Avon, Somerset, and Wiltshire Cancer Services, and published cost-effectiveness analyses. The resource use reflected the treatment patterns in the clinical trials. All costs were in UK pounds sterling (£) for the fiscal year 2005 to 2006. A 3.5% annual discount rate was applied.

Analysis of uncertainty:
A probabilistic analysis, based on a Monte Carlo simulation, was undertaken using conventional distributions for the model inputs. Cost-effectiveness acceptability curves were generated. Selected inputs were also varied in a deterministic one-way sensitivity analysis, using arbitrary ranges of values.

Results
The total costs were £17,321 with docetaxel, £13,301 with three-weekly paclitaxel, £15,973 with weekly paclitaxel, and £14,116 with nab-paclitaxel. LYs were 2.01 with docetaxel, 1.48 with three-weekly paclitaxel, 1.54 with weekly paclitaxel, and 1.62 with nab-paclitaxel. The QALYs were 1.18 with docetaxel, 0.85 with three-weekly paclitaxel, 0.89 with weekly paclitaxel, and 0.96 with nab-paclitaxel.

The incremental cost per LY gained with docetaxel was £7,614 over three-weekly paclitaxel, £2,867 over weekly paclitaxel, and £8,300 over nab-paclitaxel. The incremental cost per QALY gained with docetaxel was £12,032 over three-weekly paclitaxel, £4,583 over weekly paclitaxel, and £14,694 over nab-paclitaxel. Weekly paclitaxel was dominated by nab-paclitaxel, as it was more expensive and less effective.

The probabilistic analysis showed that the probability of docetaxel being cost-effective, compared with the three paclitaxel regimens, at a threshold of £30,000 per QALY gained, was more than 70%. The most influential model inputs were survival, paclitaxel costs, and G-CSF costs. Even when unfavourable assumptions were made, docetaxel generally remained the preferred strategy.

Authors’ conclusions
The authors concluded that docetaxel was likely to be a cost-effective alternative to three-weekly, weekly, or nab-paclitaxel from the perspective of the UK NHS.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the two licensed regimens (docetaxel and three-weekly paclitaxel) were compared, in the main analysis, and two other paclitaxel regimens were included, because they were also available.

Effectiveness/benefits:
The approach used to identify the relevant sources of data was appropriate. The key evidence was from a recent RCT and this was supplemented with data identified in a literature review, the key methods of which were reported. In general, robust sources of evidence, such as RCTs, appear to have been used. The comparison of clinical outcomes between docetaxel and three-weekly paclitaxel was from a direct head-to-head trial, while an indirect comparison was required for docetaxel versus weekly and nab-paclitaxel. The indirect comparison data were from trials comparing three-weekly paclitaxel versus weekly paclitaxel and versus nab-paclitaxel. Patient-level data were available and this allowed the analysis to account for the distribution of patient characteristics; the statistical approach was described. The benefit measures were appropriate for capturing the impact of the disease on patients’ health and permitting cross-disease comparisons. The utility estimates were reported in detail, but descriptions of their sources and how they were derived were not given.

Costs:
Both the cost categories and the data sources were consistent with the perspective. The unit costs were reported for some items. The patterns of resource consumption appeared to reflect recommended standards of care for this patient.
population. The price year, the use of discounting, and some key assumptions were explicitly reported. Alternative cost
assumptions were considered in the sensitivity analysis.

Analysis and results:
The analytic approach was valid and the results were clearly reported. The issue of uncertainty was satisfactorily
investigated and discussed, highlighting important areas for further research. The key details of the decision model and
the underlying assumptions were provided. The authors stated that this was the first study to compare paclitaxel with
docetaxel, using the results of a recent head-to-head trial, but previous analyses had generally found similar results.

Concluding remarks:
The study was well carried out and was satisfactorily reported, enhancing the validity of the authors’ conclusions.

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