Cost-utility analysis of taxane therapy
Yee G C

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
Treatment of anthracycline-resistant metastatic breast cancer using single agent chemotherapy with paclitaxel or docetaxel.

Type of intervention
Treatment; Palliative care.

Economic study type
Cost-utility analysis.

Study population
The study population was a hypothetical cohort of terminally ill female patients with anthracycline-resistant metastatic breast cancer.

Setting
Hospital. The review was conducted in Gainsville, Florida, USA and the original analysis in the UK.

Dates to which data relate
Effectiveness data were derived from the literature and expert opinion between 1994 and 1997. Resource data were taken from a 1996 publication. The price years were not stated.

Source of effectiveness data
Effectiveness data were derived from the literature and expert opinion.

Modelling
A Markov state transition model was used in estimating the costs and outcomes associated with treatment. The model was used to integrate utilities identified from time spent in different health states in the survival period, and the costs of the treatment from a short term period to a longer period. It was assumed that the overall duration of survival in both groups was the same and that the treatment with a higher response rate led to a shorter duration of progressive deterioration in health. The model was used due to a lack of effectiveness information on docetaxel and paclitaxel.

Outcomes assessed in the review
The outcomes assessed in the review were the frequencies of adverse events, response rates and response durations associated with the use of paclitaxel and docetaxel.
Study designs and other criteria for inclusion in the review
The types of study design included were not stated, although one paper reports on the results of a phase II trial of docetaxel.

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
2 primary studies were included.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not investigated.

Results of the review
Results from the literature were used with other sources and the results of this are reported below.

Methods used to derive estimates of effectiveness
The opinions of medical experts were used in conjunction with the literature and package inserts to provide information on the frequency of adverse events, treatment response rates and response duration rates

Estimates of effectiveness and key assumptions
The frequency of adverse events associated with the use of paclitaxel or docetaxel respectively were as follows:

- infection, 23% and 26%;
- febrile neutropenia, 12.5% and 22%;
- death associated with infection and febrile neutropenia, 1.0% and 0.8%;
- severe neurotoxicity, 7% and 3.5%;
- severe fluid retention, 0% and 7%;
- and severe arthralgia, myalgia or skin reaction, 16% and 12%.

The response rates for paclitaxel and docetaxel were found to be 21% and 47% respectively. The median duration of response was estimated to be six months, the disease being stable for three months and the one year mortality rate was assumed to be 57%. The response duration rates and mortality rates were assumed to be the same for both drugs.
assumed that 25% of infections and incidents of febrile neutropenia would require hospitalisation.

**Measure of benefits used in the economic analysis**
The measure of benefits was Quality Adjusted Life Years (QALYs) gained. A Markov model was used to estimate these, extrapolating assumptions and short term data to a longer time period. A survey of more than 100 oncology nurses in five countries was used to determine utility scores for eight different health states. The specific valuation tool used was not stated.

**Direct costs**
Costs associated with treatment and adverse effects were estimated from the perspective of the UK National Health Service. Specifically these costs included those for the two drugs, drug administration, febrile neutropenia with and without hospitalisation, death associated with infection, progressive disease, terminal disease and toxicity. The resources used were based on the opinion of UK medical experts.

**Indirect Costs**
Not included.

**Currency**
US dollars ($). A conversion from UK pounds Sterling () was performed, although no information on this was provided.

**Sensitivity analysis**
A sensitivity analysis was conducted to test the sensitivity of the model to changes in drug response rates, levels of dosage and infusion durations and docetaxel acquisition costs. The method used to conduct this analysis was not stated.

**Estimated benefits used in the economic analysis**
The incremental gain in QALYs using docetaxel treatment rather than paclitaxel was 0.0905 per patient or 33 days of good health. The duration of benefits from both treatments was until the end of life, (usually no longer than nine months). Side effects of treatment were included in the analysis and utilities for various health states specifically took these into account. Benefits were not discounted.

**Cost results**
The total costs of the two treatment regimens, and related adverse effects per patient were $13,221 and $13,584 for paclitaxel and docetaxel respectively. The incremental cost using docetaxel was therefore 363 per patient. Costs were not discounted and were estimated for the duration of lifetime.

**Synthesis of costs and benefits**
The base case incremental cost utility ratio using docetaxel therapy rather than paclitaxel therapy was estimated to be $4,011 per QALY gained. In sensitivity analysis the model was found to be sensitive to the docetaxel response rate and, if the response rate was increased to 56%, the incremental cost per QALY gained was $1,957. If the response rate for paclitaxel was increased to 33% docetaxel became dominant as the costs of paclitaxel treatment increased whilst utility remained lower than for docetaxel. The model was also sensitive to the acquisition costs of docetaxel:with a 15% increase in these costs the incremental cost per QALY gained was $19,214, and similarly with 10% and 5% increases, these ratios were $14,402 and $9,336 per QALY gained respectively. Using utility data pooled from five countries (Germany, Italy, Spain, USA and Canada) the baseline incremental costs per QALY gained were $4,732.

**Authors' conclusions**
The author concluded from the review that cost utility analysis was a useful method for evaluating treatments which do not have any impact on overall mortality in terminally ill patients but do have an impact on their quality of life. It is particularly important with these regimens in oncology to measure the impact of adverse events associated with these regimens before reaching any decision on what treatment protocol to recommend. The author does note that although the results of the model are not easily generalisable, the incremental costs per QALY fall within acceptable levels in the USA.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used. Paclitaxel is a commonly used salvage treatment option for women with anthracycline-resistant metastatic disease, whilst docetaxel is a new alternative demonstrated to have significant antitumour activity.

Validity of estimate of measure of benefit
The methods by which the studies were identified from the literature were not stated and only two primary studies appear to have been used. Additionally it is not clear from this review if utility scores were based solely on data from the UK and/or from other countries.

Validity of estimate of costs
Insufficient details were provided in this review on how the costs of the treatments were calculated in the UK. Price years have not been stated and the conversion rate used to convert Sterling into US dollars was not reported. In addition costs were from the perspective of the UK National Health Service and costs to others in society such as informal caregivers and the patients themselves have not been included.

Other issues
The model referred to in this review is unlikely to be generalisable due to practice variations in the UK in comparison with other countries. As was stated in the paper it has, subsequently, been adapted for use in other countries.

Implications of the study
The paper suggests that there is a need for well designed clinical and economic evaluations to determine the effectiveness and costs of docetaxel and other alternative regimens.

Source of funding
None stated.

Bibliographic details

PubMedID
9435927

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM
MeSH
Animals; Antineoplastic Agents, Phytochemical /economics /therapeutic use; Cost-Benefit Analysis; Humans; Neoplasms /drug therapy /economics; Paclitaxel /analogs & derivatives /economics /therapeutic use; Taxoids

AccessionNumber
21998000131

Date bibliographic record published
28/02/1999

Date abstract record published
28/02/1999