Cost-utility analysis of chemotherapy using paclitaxel, docetaxel, or vinorelbine for patients with anthracycline-resistant breast cancer

Leung P P, Tannock I F, Oza A M, Puodziunas A, Dranitsaris G

**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**
Chemotherapy using paclitaxel, docetaxel or vinorelbine for anthracycline-resistant breast cancer.

**Type of intervention**
Treatment.

**Economic study type**
Cost-utility analysis.

**Study population**
Patients with anthracycline-resistant metastatic breast cancer.

**Setting**
Hospital. The economic study was carried out in Toronto, Ontario, Canada.

**Dates to which data relate**
Effectiveness data were derived from studies previously published between 1995 and 1998. Resource use and cost data were collected from 1996-1998 sources. The price year was 1999.

**Source of effectiveness data**
Effectiveness data were derived from a review/synthesis of previously completed studies.

**Modelling**
A decision-tree analytic model was used to determine the cost per quality-adjusted progression-free survival for the three chemotherapeutic agents.

**Outcomes assessed in the review**
The review assessed toxic death rates, treatment-limiting toxicity rates, tumour response rates, and utility values.

**Study designs and other criteria for inclusion in the review**
Not reported.

**Sources searched to identify primary studies**
Not reported.

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

**Methods used to judge relevance and validity, and for extracting data**
Effectiveness estimates were based on summary statistics from individual studies.

**Number of primary studies included**
At least 4 primary studies were included in the review.

**Methods of combining primary studies**
Primary studies were combined using narrative methods.

**Investigation of differences between primary studies**
Not reported.

**Results of the review**
The median number of cycles of paclitaxel was 6, generating a response rate of 21% and 4% discontinuation because of toxicity. The proportion of toxic deaths was 0.4%. The number of weeks to disease progression was 16.8. The median number of cycles of docetaxel was 6, generating a response rate of 30% and 4.4% discontinuation because of toxicity. The proportion of toxic deaths was 2%. The number of weeks to disease progression was 19. The median number of cycles of vinorelbine was 9, generating a response rate of 16% and 0% discontinuation because of toxicity. The proportion of toxic deaths was 0%. The number of weeks to disease progression was 12.

**Measure of benefits used in the economic analysis**
Quality-adjusted progression-free survival was used as the measure of benefits. Utilities were derived using the time trade-off technique based on the opinion of healthy volunteers and 25 breast cancer patients. Benefits were not discounted which was appropriate given the short time frame of the study.

**Direct costs**
Direct costs were not discounted given the short time frame of the study (from the first cycle of chemotherapy until up to 3 weeks after the last cycle). Quantities and costs were reported separately. Direct costs included costs of acquisition, preparation, and administration of chemotherapy; premedications; laboratory tests; hospitalisation; clinic visits; management of adverse effects or complications; and all related physician fees. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Cost of drugs and supplies were based on the 1998 pharmacy order catalogue. Costs for biochemistry and hematology tests, as well as diagnostic imaging, were obtained from the Departments of Biochemistry, Microbiology, and Diagnostic Imaging. The cost of hospitalisation was based on the cost reported by the Ontario Hospital Association for a teaching hospital. The cost of oncologists’ fees was obtained from the Schedule of Benefits. The price year was 1999.

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

**Currency**
Canadian dollars (Can$) with Can $1 = US $0.67 as of April 1999.

**Sensitivity analysis**
Sensitivity analyses were conducted on the choice of subsequent therapy, utility scores derived from healthy volunteers or breast cancer patients, the number of cycles before treatment-limiting toxicity occurred with taxanes, and response rates and treatment costs based on 95% confidence intervals.

**Estimated benefits used in the economic analysis**
Using the healthy volunteers' scores, quality-adjusted progression-free survival was longer after the use of vinorelbine. Paclitaxel provided the greatest clinical benefit when patients' scores were used, although the difference was small. Results (quality-adjusted progression free survival) were as follows:

Health volunteers:
- Paclitaxel, 37.2 days
- Docetaxel, 33.6 days
- Vinorelbine, 38.0 days

Breast Cancer Patients:
- Paclitaxel, 39.8 days
- Docetaxel, 33.2 days
- Vinorelbine, 35.0 days.

**Cost results**
The cost per cycle with vinorelbine was 30% of that with paclitaxel and 20% of that with docetaxel. The vinorelbine strategy generated savings of Can$2,780 over paclitaxel and Can$6,831 over docetaxel, on a per patient basis.

**Synthesis of costs and benefits**
The average cost per quality-adjusted progression-free year was Can$59,096 for paclitaxel, Can$110,072 for docetaxel, and Can$31,220 for vinorelbine. The initial use of vinorelbine followed by paclitaxel was the most economically attractive treatment pathway if subsequent chemotherapy was indicated. Substituting preference scores, varying the number of cycles for taxane discontinuation due to toxicity, and re-analysing baseline results using 95% confidence intervals for cost and tumour response did not affect rank order based on cost-effectiveness.

**Authors' conclusions**
Palliative chemotherapy with vinorelbine in anthracycline-resistant metastatic breast cancer patients has economic advantages over the taxanes and provides at least equivalent quality-adjusted progression-free survival. These benefits are largely related to its lower drug acquisition cost and better toxicity profile.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the comparators used, namely that they were approved chemotherapy treatments. You, as a user of this database, should decide if these health technologies are 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. More details could have been provided on how studies were identified, how estimates from individual primary studies were combined and how differences between primary studies were handled. The estimation of benefits was modelled. The instrument used to derive a measure of health benefit, the time trade-off technique, was appropriate.

**Validity of estimate of costs**
All categories of cost relevant to the perspective adopted were included in the analysis. The cost of palliative care until death, following subsequent treatment failure was not considered. Quantities and costs were reported separately. A sensitivity analysis was performed on both quantities and costs. The price year was reported. Costs refer to the Canadian setting and might not apply to other countries.

**Other issues**
The authors did make appropriate comparisons of their findings with those from other studies, but the issue of generalisability to other settings was not addressed. The study considered patients with anthracycline-resistant metastatic breast cancer and this was reflected in the authors’ conclusions. The possible palliative benefits from subsequent therapy were not considered. It was assumed that the cost per cycle was not influenced by progression after initial treatment with one of the study drugs.

**Implications of the study**
There is still ongoing debate on the issue of subsequent chemotherapy beyond progression, versus hormonal therapy or best supportive care.

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**Other publications of related interest**


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