Economic evaluation of intensive chemotherapy with prophylactic granulocyte colony-stimulating factor for patients with high-risk early breast cancer in Japan

Ishiguro H, Kondo M, Hoshi SL, Takada M, Nakamura S, Teramukai S, Yanagihara K, Toi M

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
The objective was to assess the cost-effectiveness of third-generation chemotherapy regimens plus prophylactic granulocyte-colony stimulating factor (G-CSF), relative to second-generation regimens without prophylactic G-CSF for patients with high-risk early breast cancer, in Japan. The authors concluded that third-generation regimens including prophylactic G-CSF were cost-effective. Most of the methods appear to have been adequate, but the lack of information on the clinical data means that the appropriateness of the authors’ conclusions cannot be assessed.

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

Study objective
The objective was to assess the cost-effectiveness of third-generation chemotherapy regimens with prophylactic granulocyte-colony stimulating factor (G-CSF), relative to second-generation regimens without prophylactic G-CSF, for patients with high-risk early breast cancer, in Japan. Three age groups were analysed; those aged 35, 45, and 55 years.

Interventions
Two comparisons were assessed. In the first, fluorouracil, doxorubicin, and cyclophosphamide, a second-generation regimen, was compared with docetaxel, doxorubicin, and cyclophosphamide, a third-generation regimen, plus G-CSF. In the second, paclitaxel, doxorubicin, and cyclophosphamide every three weeks, a second-generation regimen, was compared with dose-dense paclitaxel, doxorubicin, and cyclophosphamide every two weeks, a third-generation regimen, plus prophylactic G-CSF.

Location/setting
Japan/in-patient care.

Methods
Analytical approach:
A decision analytic model was constructed to simulate the clinical courses followed by breast cancer patients after primary surgery. The time horizon was the lifetime of the patient and the authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness data were derived from the literature, as well as assumptions made by experts. The main effectiveness estimates were the effectiveness of adjuvant chemotherapy and the toxicity of the regimens. These were from a number of trials (Martin, et al. 2005, Citron, et al. 2003, and Martin, et al. 2006, see ‘Other Publications of Related Interest’ below for bibliographic details).

Monetary benefit and utility valuations:
The utilities were obtained from published literature.

Measure of benefit:
Life-years and quality-adjusted life-years (QALYs) gained were the measures of benefit and future outcomes were discounted at an annual rate of 3%.
Cost data:
Those costs borne by both patients and third-party payers were included, but productivity losses and costs to sectors other than health care were not included. The included costs were those relating to: toxicity; treatment of progressive disease, including hormone therapy; palliative care; and treatment failure. All costs were from national medical care fee schedules and prescription drug prices. The price year was 2006 and the costs were reported in Japanese yen (JPY). They were discounted at an annual rate of 3%. The budget impact of the widespread use of third-generation regimens with prophylactic G-CSF was calculated.

Analysis of uncertainty:
A series of one-way sensitivity analyses was performed to evaluate the uncertainty in the probabilities, utility weights, and costs used in the model.

Results
Compared with the fluorouracil regimen, the docetaxel regimen incremental cost-effectiveness ratio (cost per life-year gained) was JPY 956,471 for 35-year-olds, JPY 1,125,540 for 45-year-olds, and JPY 1,302,746 for 55-year-olds. The incremental cost-utility ratio (cost per QALY gained) was JPY 919,443 for 35-year-olds, JPY 1,078,967 for 45-year-olds, and JPY 1,224,896 for 55-year-olds.

Compared with the paclitaxel regimen, the dose-dense paclitaxel regimen incremental cost-effectiveness ratio was JPY 291,931 for 35-year-olds, JPY 357,354 for 45-year-olds, and JPY 377,011 for 55-year-olds. The incremental cost-utility ratio was JPY 311,232 for 35-year-olds, JPY 380,148 for 45-year-olds, and JPY 399,761 for 55-year-olds.

The results of the sensitivity analysis showed that under all scenarios, third-generation chemotherapy regimens were cost-effective, at a cost-effectiveness threshold of JPY 6 million per QALY gained.

Authors' conclusions
The authors concluded that third-generation regimens with prophylactic G-CSF were cost-effective.

CRD commentary
Interventions:
The interventions were reported clearly and in detail.

Effectiveness/benefits:
The authors reported that the effectiveness and clinical data were from clinical trials, other published literature and experts' assumptions. They did not report the details of their literature review nor how the expert opinion was elicited. This means it is not possible to determine if all the relevant data were included. There was also no information on the quality of the clinical evidence used. The sources of the utility data were reported, but further details were not.

Costs:
The authors reported that a societal perspective was adopted, but productivity costs and those borne by non-health care sectors of the economy were not included. It appears that all the cost categories relevant to a third-party payer perspective were included. The sources for these costs were clearly reported and the costs of the intervention were related to the clinical trial data. The price year, time horizon, discount rate, and currency details were all reported.

Analysis and results:
The cost and outcome data were synthesised using a decision analytic Markov model. Detailed information on the model was provided, including a diagram. The impact of uncertainty in the model was tested in a series of one-way sensitivity analyses. This type of analysis goes some way towards assessing the impact of uncertainty on the results, but a probabilistic sensitivity analysis is a more thorough way to assess the overall model uncertainty. The main limitation that the authors reported was that none of the trials used for the treatment effectiveness included Japanese patients.

Concluding remarks:
Most of the methods appear to have been adequate, but the lack of information on the clinical data means that the appropriateness of the authors' conclusions cannot be assessed.
Funding

Bibliographic details

PubMedID
20206789

DOI
10.1016/j.clinthera.2010.01.029

Original Paper URL
http://dx.doi.org/10.1016/j.clinthera.2010.01.029

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Antineoplastic Combined Chemotherapy Protocols /adverse effects /economics /therapeutic use; Breast Neoplasms /drug therapy /economics /mortality /pathology; Chemotherapy, Adjuvant; Computer Simulation; Cost-Benefit Analysis; Disease-Free Survival; Drug Costs; Female; Granulocyte Colony-Stimulating Factor /administration & dosage /economics; Humans; Japan; Markov Chains; Middle Aged; Models, Economic; Neoplasm Recurrence, Local; Quality-Adjusted Life Years; Risk Assessment; Risk Factors; Survival Analysis; Time Factors; Treatment Outcome

AccessionNumber
22010000683

Date bibliographic record published
21/07/2010

Date abstract record published
22/12/2010