Cost-effectiveness of adding rh-endostatin to first-line chemotherapy in patients with advanced non-small-cell lung cancer in China

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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
The study estimated the cost-effectiveness of adding new recombinant-human endostatin to standard first-line platinum-based chemotherapy in patients with advanced non–small cell lung cancer in China. The authors concluded that recombinant-human endostatin was unlikely to be cost-effective when added to standard chemotherapy; however, at a high willingness to pay, it might be a cost-effective treatment option. Although the reporting of a few items in the study could have been better, the authors’ conclusions appear appropriate.

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

Study objective
The study estimated the effects of adding a new recombinant-human (rh) endostatin to standard first-line platinum-based chemotherapy in patients with advanced non–small cell lung cancer on health and economic outcomes in China.

Interventions
A standard platinum-based chemotherapy strategy (vinorelbine 25mg/m$^2$ on days 1 and 5 plus cisplatin 30mg/m$^2$ on days 2 to 4, every three weeks for four cycles) plus placebo was compared with the standard platinum-based strategy plus recombinant-human endostatin (7.5mg/m$^2$ on days 1 to 14 for each of four cycles).

Location/setting
China/secondary care.

Methods
Analytical approach:
A semi-Markov model was used to evaluate the 10-year clinical and economic outcomes associated with advanced non–small cell lung cancer and its treatment. The authors stated the perspective was that of the Chinese health care system.

Effectiveness data:
Effectiveness data mainly came from the results of a pivotal phase III trial. Kaplan-Meier survival curves for progression-free survival and overall survival for each strategy were available from this trial. The trial included 493 patients with histologically or cytologically confirmed stage IIIB or IV non–small cell lung cancer, who were randomly assigned in a 2:1 ratio to receive standard platinum-based chemotherapy plus recombinant-human endostatin or standard platinum-based chemotherapy plus placebo. The data extracted from the Kaplan-Meier curves were fitted to Weibull curves (for survival analysis) using R for Statistical Computing. Adverse events were not included as they were stated to be similar between strategies.

Monetary benefit and utility valuations:
Utility values came from a published study for progression-free survival and overall survival.

Measure of benefit:
The measures of benefit were life years gained and quality-adjusted life-years (QALYs). Future QALYs were discounted at a rate of 3%.
Cost data:
The cost categories included were: first-line and second-line medical therapy (including prescription, preparation, and administration); concurrent medication during therapy; management of treatment-related severe adverse events (grade 3 or 4); routine follow-up; and laboratory testing. Future costs were discounted at a rate of 3%. Costs were expressed in 2010 US $.

Analysis of uncertainty:
One-way sensitivity and probabilistic sensitivity analyses were conducted based on a second-order Monte Carlo simulation (1,000 simulations). Ranges were informed by local sources or the international literature.

Results
Treatment with recombinant-human endostatin plus standard platinum-based chemotherapy increased the overall survival by 0.63 years and 0.35 QALYs per patient compared with standard chemotherapy, at an additional cost of $8,402.60.

The incremental cost-effectiveness ratio was $24,454.25 per QALY gained.

In one-way sensitivity analyses, the utility value of progression-free survival was the most influential factor on the results, followed by the cost of recombinant-human endostatin.

In the probabilistic sensitivity analysis, endostatin was cost-effective at a willingness to pay threshold of $17,000; if this was above $40,000, 100% of patients could achieve cost-effectiveness.

Authors' conclusions
The authors concluded that the addition of recombinant-human endostatin to standard first-line chemotherapy was unlikely to be cost-effective in China; however, at a high willingness to pay threshold, recombinant-human endostatin might be a cost-effective treatment option.

CRD commentary
Interventions:
Both interventions were clearly explained. It appeared that standard practice (first-line platinum-based chemotherapy) in the authors' setting (China) was included.

Effectiveness/benefits:
The effectiveness parameters came from a single clinical trial, but the authors did not state whether this was the only such trial. If other relevant trials existed, then their exclusion should have been justified. The source of the utility data was referenced, but no details were provided on its methods or other details. There was no indication that the literature was reviewed for utility values.

Costs:
The analysis of the costs was performed from the perspective of the Chinese health care system. It appeared that all the relevant categories had been included. All values were discounted at 3% rate. Some sources were local, but were not defined in detail.

Analysis and results:
The model structure was described in detail, including a diagram. Model parameters and their sources were adequately reported. The authors investigated uncertainty in the model parameters through probabilistic and deterministic sensitivity analyses; ranges and parameter distributions were reported. The authors presented their results in full providing a tornado graph, a cost-effectiveness acceptability curves and a scatter plot with the results of the simulations. The results were compared with those from related published studies, although these did not include recombinant-human endostatin.

Concluding remarks:
Although reporting of a few items could have been better, the conclusions reached by the authors appear appropriate.
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