Pharmacoeconomic analysis of consolidation therapy with pemetrexed after first-line chemotherapy for non-small cell lung cancer
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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 objective was to examine the cost-effectiveness of consolidation therapy with pemetrexed, compared with no consolidation therapy, after first-line chemotherapy for patients with non-small cell lung cancer. The authors concluded that, for all histological groups, consolidation therapy did not provide value-for-money for the Japanese health care payer. The cost-effectiveness methods were valid and the authors’ conclusions appear to be robust.

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

Study objective
The objective was to examine the cost-effectiveness of consolidation therapy with pemetrexed, compared with no consolidation therapy, after first-line chemotherapy for patients with non-small cell lung cancer (NSCLC).

Interventions
Consolidation therapy, after first-line chemotherapy, consisted of pemetrexed 500mg per m² every three weeks until disease progressed. This was compared with no consolidation therapy, where pemetrexed was started only after disease progressed and continued until disease progressed. For both options, erlotinib 150mg per day was the next line of therapy. All patients received vitamin B12 and folic acid.

Location/setting
Japan/out-patient.

Methods
Analytical approach:
The analysis was based on a Markov model, with a time horizon of three years. The health states were different for the two options analysed. The authors stated that the analysis was conducted from the perspective of the health care payer.

Effectiveness data:
The clinical inputs were from published sources. No head-to-head studies were available for the two options. Most of the data were from three randomised controlled trials; one on consolidation therapy, another on pemetrexed as second-line therapy, and the third on erlotinib. The key endpoint was the rate of progression-free survival.

Monetary benefit and utility valuations:
The utility values were from a UK study.

Measure of benefit:
Life-years and quality-adjusted life-years (QALYs) were the summary benefit measures. A 3% annual discount rate was applied.

Cost data:
The economic analysis included the costs of the drugs, hospitalisation, out-patient visits, injection fees, out-patient chemotherapy, preparation of a sterile environment, pharmacy fees, peripheral blood tests, chest X-ray, and computed tomography (CT) scan. The unit costs were calculated on the basis of the Japanese drug tariff and medical fees per
treatment or procedure. The resource use was based on standard treatment, expert opinion, and published evidence. All costs were in Japanese yen (JPY) and US dollars ($). A 3% annual discount rate was applied and the price year was 2009.

Analysis of uncertainty:
One-way and probabilistic sensitivity analyses were carried out, by varying each model parameter over its 95% confidence interval or by ±25% of its baseline value. Some inputs were varied using arbitrary ranges. A probabilistic sensitivity analysis was based on a Monte Carlo simulation that assigned conventional distributions to the model inputs and created cost-effectiveness acceptability curves.

Results
For patients with any histology, the overall survival was 451.8 days with consolidation therapy and 366.2 days without consolidation. The QALYs were 0.6770 with consolidation and 0.5511 without it. The costs were $64,409 with consolidation and $38,843 without it.

The incremental cost per life-year gained with consolidation therapy was $109,024 and the incremental cost per QALY gained was $203,022.

In patients with non-squamous cell carcinoma, the incremental cost was $80,563 per life-year gained and $150,115 per QALY gained. In patients with adenocarcinoma, it was $101,787 per life-year gained and $208,778 per QALY gained. In patients with squamous cell carcinoma, consolidation therapy was dominated as it was less effective and more expensive than no consolidation therapy.

The sensitivity analyses confirmed the base-case findings. Regardless of the model assumptions, the incremental cost per QALY gained was always above $150,000 for all histological types, and the incremental cost per life-year gained was always above $67,785. The probability of consolidation therapy being cost-effective at a threshold of JPY 5 million ($43,478) per life-year gained was zero, for patients in all histology groups.

Authors' conclusions
The authors concluded that, for all histological groups, consolidation therapy did not provide value-for-money for the Japanese health care payer.

CRD commentary
Interventions:
The selection of the comparators appears to have been appropriate for the management of patients with NSCLC. The dosages were reported.

Effectiveness/benefits:
The clinical inputs were not well described. No review of the literature was reported to identify the relevant sources of data. The main sources were randomised controlled trials, which should have been of good quality. The patients' characteristics were from these trials, and appear to have been appropriate. A lack of head-to-head trials comparing the two options was a limitation of the analysis. The derivation of the utility values was not fully described, but they were from UK patients with NSCLC. QALYs and life-years were appropriate benefit measures, as they capture the impact of cancer on the patients' health and allow comparisons with the benefits of other health care interventions.

Costs:
The cost categories were representative of the third-party payer perspective, as stated by the authors. The unit costs and resource quantities were provided for most categories, enhancing the transparency of the analysis. The sources were relevant to the Japanese setting and the costs were presented in JPY and $ increasing the comparability of the results. Details, such as the price year and discount rate, were reported and the costs were varied in the sensitivity analyses.

Analysis and results:
A different model was used for each of the two options. The model outcomes were clearly reported. An incremental approach was used to combine the costs and benefits of the two strategies. The uncertainty was investigated in deterministic and probabilistic analyses and the results were clearly reported. The findings appear to be specific to
Japan and might be difficult to transfer to other settings.

Concluding remarks:
The cost-effectiveness methods were valid and the authors' conclusions appear to be robust.

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