Cost-effectiveness of maintenance pemetrexed in patients with advanced nonsquamous-cell lung cancer from the perspective of the Swiss health care system

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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 of the study was to assess the cost-effectiveness of maintenance pemetrexed in patients with advanced non-squamous cell lung cancer. The authors concluded that maintenance with pemetrexed in patients with advanced non-squamous cell lung cancer was not cost-effective. Overall quality of the study was good with both methods and results reported adequately. Within the scope of the study, the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective of the study was to assess the cost-effectiveness of maintenance pemetrexed in addition to best supportive care in patients with advanced non-squamous cell lung cancer.

Interventions
The study compared maintenance therapy (pemetrexed in combination with best supportive care) with best supportive care alone.

Location/setting
Switzerland/In-patient secondary care.

Methods
Analytical approach:
A Markov model was constructed to assess the costs and outcomes of the two interventions under study. The time horizon of the study was the lifetime of the patient. The perspective adopted in the economic analysis was that of the Swiss healthcare system.

Effectiveness data:
The clinical and effectiveness data were derived from a single phase III placebo-controlled randomised study by Ciuleanu et al. (see Other Publications of Related Interest). The main measure of effectiveness used in the model was progression-free survival. Overall survival was considered as a secondary outcome. The authors reported that progression-free survival was only estimated from the 481 non-squamous cell lung cancer patients included in the trial. Hazards were assumed constant over time and were converted into transition probabilities using median time spent in each stage of disease.

Monetary benefit and utility valuations:
Utility estimates were derived from previously published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) gained. Benefits could be generated over the lifetime of the patient. The short life expectancy of patients meant that benefits were left undiscounted.

Cost data:
The direct costs included in the economic analysis were pemetrexed, chemotherapy, monitoring, treatment of side-
effects and follow-up treatment. For the pemetrexed group, resource use was obtained from the same clinical trial as that used to obtain treatment effectiveness. Costs associated with best supportive care were derived from a Dutch study. The authors reported that all costs were adjusted for purchasing power differences between Netherlands and Switzerland. The price year was 2010. All costs were reported in Euros (€) at an exchange rate of 1 Swiss Franc = €0.72. Costs could be incurred over the lifetime of the patient but were left undiscounted due to the short life expectancy of patients.

Analysis of uncertainty:
The authors conducted a series of one-way and probabilistic sensitivity analyses to assess the influence of uncertainty on key model parameters. A probabilistic sensitivity analysis was conducted by fitting model parameters with corresponding probability distributions and based on 1,000 sets of randomly drawn input parameters.

**Results**
Average QALYs gained with maintenance therapy (pemetrexed in combination with best supportive care) was 0.82. Average cost per patient was €99,705.

Average QALYs gained with best supportive care was 0.56. Average cost per patient was €71,316.

Costs and benefits were combined using an incremental cost-utility ratio (additional cost per QALY gained). Compared with best supportive care alone, maintenance therapy (pemetrexed in combination with best supportive care) was associated with an incremental cost-utility ratio of €106,202 per QALY gained.

Results of the probabilistic sensitivity analysis showed that the probability that pemetrexed in combination with best supportive care was cost-effective at a willingness to pay threshold of €72,000 was 23.4%. Assuming that the costs of best supportive care were 10 times lower than pemetrexed, the probability of pemetrexed being cost-effective was 50.6%.

**Authors’ conclusions**
The authors concluded that maintenance with pemetrexed in patients with advanced non-squamous-cell lung cancer was not cost-effective in their setting.

**CRD commentary**
**Interventions:**
The interventions were reported adequately.

**Effectiveness/benefits:**
The clinical and effectiveness data were derived from a single phase III placebo-controlled randomised study. The authors reported that only one study was used because no other trial with a similar setting was available. Brief details of the trial were provided. Key results and full bibliographic details were provided. Given that this was a randomised controlled trial (the gold-standard when comparing healthcare interventions) published in a high-impact peer reviewed journal, it was likely that the effectiveness results used in the model were internally valid.

**Costs:**
The authors reported that the perspective in the economic analysis was that of the Swiss healthcare system. It appeared that all major relevant cost categories for this perspective were included in the analysis. The sources from which costs were derived were reported adequately. The price year, time horizon and currency conversions were all reported adequately.

**Analysis and results:**
Clinical and outcome data were synthesised using a decision Markov analytic model. The authors provided appropriate details of the model structure, including a graphical depiction. The authors reported that the model was tested and calibrated to match the original survival data of the study by Ciuleanu et al. (see Other Publications of Related Interest) An exhaustive series of one-way and probabilistic sensitivity analyses assessed the impact of uncertainty on the model’s results. The authors reported that the main limitation to the study was the availability of only once clinical trial.
Concluding remarks:
Overall quality of the study was good. Methods and results were reported adequately. Within the scope of the study, the authors’ conclusions appear to be valid.

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