Cost-effectiveness analysis of FDG PET-CT in the management of pulmonary metastases from malignant melanoma

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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
This study examined the cost-effectiveness of two surveillance programmes, which were a combination of fluorine-18 fluoro-2-deoxyglucose positron emission tomography (PET) with X-ray computed tomography (CT) versus whole-body CT alone, in patients with suspected pulmonary metastasised melanoma. The authors concluded that PET-CT provided value for money as it improved survival at a lower cost. The description of the clinical data was limited, but the methods were valid and this should ensure the validity of the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of two surveillance programmes: a simultaneous combination of fluorine-18 fluoro-2-deoxyglucose (FDG) positron emission tomography (PET) with X-ray computed tomography (CT) versus whole-body CT alone, in patients with suspected pulmonary metastasised melanoma.

Interventions
FDG PET-CT surveillance was compared against the conventional approach, which was a whole-body CT scan, from the head and neck region to the pelvis, without FDG PET.

Location/setting
Belgium/out-patient.

Methods
Analytical approach:
The analysis was based on a Markov model with a 10-year horizon. The authors stated that the perspective of the health care payer was adopted.

Effectiveness data:
The clinical data were from published studies and were confirmed by expert opinion. The authors reported that the probability of developing pulmonary metastases was from recent data from the Duke Comprehensive Cancer Centre. Mortality data were from Belgian life tables and few details were reported for the remaining clinical data. The accuracy of the FDG PET-CT diagnostic test was the key input to the model.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
The summary benefit measure was the number of life-months (LMs) gained and a 1.5% annual discount rate was used.

Cost data:
The economic analysis included the costs of screening (visits, blood sampling, and chest X-ray), surgery and potential complications, chemotherapy and complications, palliative treatment, PET-CT, and conventional CT. The unit costs were from public prices published by the Belgian Health Insurance Institution. A micro-costing approach was used to
calculate the true costs of a PET-CT investigation. The patterns of resource consumption were from a cohort of patients whose data were stored in standardised administrative databases. The unit costs were from standard Belgian sources and followed specific guidelines. The costs were in Euros (EUR), the price year was 2009, and a 3% annual discount rate was applied.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on the model inputs, using wide ranges of values. A Monte Carlo simulation was undertaken, using predetermined probability distributions for the model inputs.

Results
The projected costs were EUR 3,438 with PET-CT and EUR 4,384 with CT alone. The LMs gained were 90.61 with PET-CT and 90.42 with CT alone. In this base case, PET-CT was dominant as it was more effective and less expensive than whole-body CT alone. PET-CT also reduced the number of futile surgeries by 20%.

The specificity of PET-CT was the most influential parameter, but the base-case conclusions were generally robust. In the probabilistic sensitivity analysis, PET-CT remained dominant with a net saving of EUR 1,048 and a gain of 0.2 LMs. The dominance of PET-CT was found in 71% of simulations.

Authors’ conclusions
The authors concluded that including PET-CT in the management of patients with high-risk malignant melanoma provided value for money as it improved survival at lower costs.

CRD commentary
Interventions:
The comparator appears to have been appropriately selected as the proposed surveillance strategy was compared with the conventional protocol for this patient population.

Effectiveness/benefits:
The reporting of the clinical part of the study was limited. The approach used to identify the relevant sources of data was not clearly described and no details were reported of the methods and other features of the sources used to derive the clinical inputs, except for the use of a large US database. It was stated that there was high heterogeneity between the studies used, but the methods used to deal with this issue were not provided. Wide ranges of values were used in the sensitivity analysis and this would have helped to overcome these limitations. Survival was an appropriate benefit measure as life expectancy appears to be the most relevant outcome for these interventions. The number of futile surgeries was also reported and might be of specific clinical interest. The impact of the disease on quality of life was not considered as there was a lack of published data.

Costs:
The economic inputs were appropriate for the perspective of the health care system as only the direct medical costs were considered. The authors noted that palliative care costs were equivalent in both groups, but were included in the model. The price year and the use of discounting were reported and the data sources reflected the study perspective. The resource quantities were from a large cohort of patients, but the data were not reported. The unit costs were reported for most items, but some costs were presented as category totals. The costs were appropriately varied in the sensitivity analyses.

Analysis and results:
The results were clearly reported and a synthesis of the costs and benefits was not required because the proposed diagnostic process was superior economically and clinically. The issue of uncertainty was satisfactorily investigated, using two approaches, and the ranges and distribution types were reported. An extensive description of the model and its underlying assumptions was given. Conventional discounting was applied to the costs and benefits. The authors acknowledged some limitations of their analysis, which mainly related to the sources of clinical data and the need for several assumptions.

Concluding remarks:
The description of the clinical data was limited, but the methods were valid and this should ensure the validity of the authors' conclusions.

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