Cost-effectiveness of dual-head F-18-fluorodeoxyglucose PET for the detection of recurrent laryngeal cancer

Bongers V, Hobbelink M G, van Rijk P P, Hordijk G J

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.

Health technology
The use of positron emission tomography with fluorine-18 deoxyglucose (18F-FDG-PET) for the diagnosis of laryngeal cancer.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients that had been treated with high-dose radiotherapy for primary laryngeal squamous cell carcinoma and who were suspected of having recurrent laryngeal cancer.

Setting
The setting was a hospital. The economic study was carried out at the University Medical Centre Utrecht, The Netherlands.

Dates to which data relate
The effectiveness and resource use data were gathered between November 1996 and September 1999. The price year was 2000.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was performed retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations to determine the sample size were not performed. A sample of 80 patients consecutively recruited at the study institution from November 1996 to September 1999 was included in the study. These patients underwent both 18F-FDG-PET and biopsy. The mean age was 60.5 years (range: 36 - 85) and 71 patients were men. The initial tumour stage was T1 in 25 patients, T2 in 37 patients, T3 in 12 patients, and T4 in 6 patients. A sub-group of 33 patients underwent a CT scan.
Study design
The study used a cohort of patients who underwent 18F-FDG-PET, both at study entry and again between 3 months and one year after the first assessment. The same group of patients underwent a biopsy assessment. As reported earlier, a sub-group of patients was evaluated using a CT scan. The study was carried out at the University Medical Centre Utrecht. The mean follow-up was 31.6 (+/- 9.8) months and no loss to follow-up was reported.

Analysis of effectiveness
All patients included in the study were accounted for in the analysis. The primary health outcomes were sensitivity, specificity, positive predictive values (PPVs) and negative predictive values (NPVs).

Effectiveness results
After one year of follow-up, the sensitivity was 100% in patients undergoing 18F-FDG-PET and 50% in those undergoing the CT scan;

the specificities were 85% (18F-FDG-PET) and 33% (CT), respectively;

the PPVs were 87% (18F-FDG-PET) and 74% (CT), respectively; and

the NPVs were 100% (18F-FDG-PET) and 30% (CT).

Clinical conclusions
The effectiveness analysis showed that, compared with CT scan, 18F-FDG-PET was highly effective as a diagnostic tool for patients suspected of having recurrent laryngeal cancer, as observed in patients assessed using biopsy as the ultimate diagnostic procedure.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used. A cost-consequences analysis was therefore carried out.

Direct costs
No discounting was performed as the costs were incurred over less than 2 years. The unit costs were reported. The cost categories included in the analysis were staff, materials, maintenance and investments. The cost/resource boundary adopted in the analysis was that of the hospital. The costs were estimated on the basis of the cost accounting system of the study hospital, using a micro-costing approach. The quantities of resources were retrospectively estimated for the period November 1996 to September 1999. The price year was 2000.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not included in the analysis.

Currency
Euros (EUR). The costs were originally calculated in Dutch guilders and then converted to euros at a conversion rate of 1 EUR = Dfl 12.2.
Sensitivity analysis
No sensitivity analyses were performed.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The cost per patient was EUR 682 for 18F-FDG-PET and EUR 618 with CT scans. Thus, the systematic use of 18F-FDG-PET with the subsequent reduction of CT scans and panendoscopies resulted in an additional cost of EUR 64 per patient.

Synthesis of costs and benefits
Irrelevant as a cost-consequences analysis was performed.

Authors’ conclusions
The use of positron emission tomography with fluorine-18 deoxyglucose (18F-FDG-PET) for the diagnosis of laryngeal cancer was effective in comparison with computed tomography (CT) scans, and resulted in an extra cost of EUR 64 per patient. However, the authors noted that further cost-savings could be obtained on account of the advantages related to the early detection of tumour recurrence, such as less morbidity and improvements in quality of life.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. Biopsy was selected as it represented the standard diagnostic procedure for the patients included in the study. You should decide whether it represents the ‘gold’ standard in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness measures were derived from the analysis of a single cohort of patients who underwent all diagnostic assessments, thus limiting the possible role played by confounding factors and selection bias. The study sample appears to have been representative of the study population. However, power calculations were not performed to determine an appropriate sample size.

Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The analysis of the costs was carried out from the perspective of the hospital. It would appear that all the relevant categories of costs were included in the study. The unit costs were reported separately and the price year was indicated, thus enhancing the reproducibility of the economic analysis in other contexts. The source of the cost data was reported. However, the costs and the quantities were treated deterministically and no sensitivity analyses were performed. The costs were fairly specific to the study settings. These features tend to limit the generalisability of the cost results.

Other issues
The authors compared their findings with those from other studies. The issue of the generalisability of the study results to other settings was not addressed and sensitivity analyses were not performed. Thus, the external validity of the analysis was quite low although the unit costs and the price year were reported. A sample of patients suspected of
having recurrent laryngeal cancer was enrolled in the study, and this was reflected in the conclusions of the analysis.

**Implications of the study**
The authors stated that the small additional cost of 18F-FDG-PET was acceptable as the intervention proved to be more effective than CT scans. The main advantage of 18F-FDG-PET was the fact that it represented a non-invasive diagnostic approach, which may avoid the possible complications of biopsies of tissue vulnerable after radiotherapy.

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