The cost-effectiveness of Foscan mediated photodynamic therapy (Foscan-PDT) compared with extensive palliative surgery and palliative chemotherapy for patients with advanced head and neck cancer in the UK

Hopper C, Niziol C, Sidhu M

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 Foscan-mediated photodynamic therapy (Foscan-PDT) for patients with advanced head and neck cancer in the UK.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of 10,000 identical patients with advanced head and neck cancer.

Setting
The study setting was secondary care. The economic analysis was conducted in the UK.

Dates to which data relate
The effectiveness data were from studies dating from 1992 to 2002, with one study being in press. The price year was 2001/2002.

Source of effectiveness data
The effectiveness data were derived from a review of published studies.

Modelling
A computerised cost-effectiveness model following 10,000 patients who were treated with palliative chemotherapy, extensive palliative surgery, Foscan-PDT, or no treatment, was used. Each treatment arm was populated with data on associated clinical outcomes and resource use. The model considered only the treatment-related resources over the likely duration of each treatment.

Outcomes assessed in the review
The outcomes assessed included:

the life expectancy (in years and days);
the efficacy or overall response; and
the remission or complete response, for each of the four treatment strategies investigated in the study.

**Study designs and other criteria for inclusion in the review**
The clinical outcome data were obtained from Phase III clinical trials.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
Not reported.

**Number of primary studies included**
Approximately 7 studies were included in the review. Three published studies were found for palliative chemotherapy and a further two for Foscan-PDT.

**Methods of combining primary studies**
For the clinical outcomes of palliative chemotherapy, the authors used the results from the trial that gave the most detailed accounts of regimen and resource use. For the clinical outcomes of Foscan-PDT, the most conservative efficacy results were used.

**Investigation of differences between primary studies**
The populations in the surgery and chemotherapy studies had a diagnosis of advanced head and neck cancer. The populations in the Foscan-PDT studies had advanced head and neck cancer that had failed to respond, or was inappropriate for treatment with the other therapeutic interventions. Thus, the patient groups for Foscan-PDT differed from the comparator groups, with the Foscan-PDT population having a worse prognosis.

**Results of the review**
Life expectancy was 117 days with no treatment, 198 days with palliative chemotherapy, 117 days with extensive palliative surgery, and 246 days with Foscan-PDT. Alternatively, 0.32 years with no treatment, 0.54 years with palliative chemotherapy, 0.32 years with extensive palliative surgery, and 0.67 years with Foscan-PDT.

The efficacy rate (or overall response) was 0.00 for no treatment, 0.32 for palliative chemotherapy, 0.00 for extensive palliative surgery, and 0.38 for Foscan-PDT.

The remission rate (or complete response) was 0.00 for no treatment, 0.06 for palliative chemotherapy, 0.00 for extensive palliative surgery, and 0.16 for Foscan-PDT.

**Measure of benefits used in the economic analysis**
The outcomes used were the life-years saved (LYS), overall tumour response (i.e. 50% or greater decrease in total tumour surface area) and complete response (i.e. disappearance of all known local disease).
Direct costs
The direct costs included in the analysis were those of the hospital. The costs in the Foscan group were for outpatient appointments, inpatient stay on a surgical ward, the surgeon, Foscan, other drugs (lactulose and morphine MST), and the laser. The costs in the palliative chemotherapy group, based on four cycles of treatment, were for pre-infusion hydration with normal saline, inpatient stay on a medical oncology ward, the consultant oncologist and chemotherapy nurse, and other drugs (cisplatin, 5-fluorouracil, ondansetron intramuscular, and ondansetron oral). The costs in the extensive palliative surgery group were for surgical preparation outpatient appointment, dietician, physiotherapist, speech therapist, anaesthetist, inpatient stay on a surgical ward, surgical placement of feeding tube, and complex surgery (i.e. mouth or throat procedure of category 6, liquid feed, and postoperative counselling). The costs of no treatment were only those arising from medical outpatient appointments.

The resource use and unit costs were derived either by expert opinion or from published literature. The resource quantities and the costs were reported separately. Since all the costs were incurred during less than one year, discounting was not relevant and was not performed. The study reported the average costs. The price year was 2001/2002.

Statistical analysis of costs
The resource use and costs were treated as point estimates (i.e. the data were deterministic).

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

Currency
UK pounds sterling (€).

Sensitivity analysis
To negate over or underestimation of resource consumption and costs, a number of sensitivity analyses were applied to the data. A one-way sensitivity analysis varied the associated costs of Foscan-PDT (range: 10% - 200%) in comparison with the static costs of chemotherapy and surgery. It also varied the costs of chemotherapy and surgery (range: 25 - 200%) in comparison with the static costs of Foscan-PDT, and the overall response rate for extensive surgery (0% - 60%). A two-way analysis of Foscan-PDT versus chemotherapy and versus surgery varied the two comparison intervention costs simultaneously between 25 and 200%. For Foscan-PDT, all the costs were varied apart from the unit cost of Foscan medication. The proportion of patients in the Foscan arm receiving the injection through an outpatient appointment, as opposed to an inpatient day, was varied between 0 and 100%. The number of palliative chemotherapy cycles was varied from 0 to 17.

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

Cost results
The average cost per patient was 5,740.68 in the Foscan-PDT group, 9,9924.49 in the palliative chemotherapy group, 16,911.61 in the extensive palliative surgery group, and 720.00 in the no treatment group.

Synthesis of costs and benefits
An incremental cost-effectiveness analysis (i.e. the difference in costs between treatments over the difference in effectiveness between the two treatment options) was undertaken.

The incremental cost per LYS of Foscan-PDT compared with no treatment was 14,206. To be cost-effective at 30,000/LYS, Foscan-PDT needed to add 61 days of life expectancy compared with no treatment.
The incremental cost per overall response of Foscan-PDT compared with no treatment was 28,764.

The incremental cost per remission of Foscan-PDT compared with no treatment was 153,408. Foscan-PDT was found to be both more effective and cheaper than both palliative chemotherapy and extensive palliative surgery.

The results of the sensitivity analysis showed that Foscan-PDT continued to have a lower unit cost than palliative chemotherapy until the number of chemotherapy cycles was reduced to two or less. Even with assumed maintenance of chemotherapy efficacy, Foscan-PDT remained cost-effective versus two or fewer chemotherapy cycles. Foscan-PDT also remained cost-effective when the costs used were decreased and/or the costs used for Foscan-PDT were increased.

Authors’ conclusions
Compared with palliative chemotherapy or extensive palliative surgery, Foscan-mediated photodynamic therapy (Foscan-PDT) was a clinically and cost-effective treatment option for patients with advanced head and neck cancer.

CRD COMMENTARY - Selection of comparators
A justification for the comparators used was given. The authors reported that palliative chemotherapy or palliative surgery is currently offered with the aim of reducing tumour mass, halting tumour fungation and/or retaining organ function. However, they also reported that the real-life comparator for Foscan-PDT would be no treatment, because by license definition, patients approved for Foscan-PDT have no other treatment options available. You should decide if these are widely used health interventions in your own settings.

Validity of estimate of measure of effectiveness
The authors did not report that a systematic review of the literature had been undertaken to identify all relevant research and minimise biases. The authors also failed to report how the Phase III clinical trials used in the review were identified. The studies were not combined as the authors used one trial for each of the treatment options to derive clinical outcomes. For Foscan-PDT, the authors used the most conservative efficacy results, while for palliative chemotherapy, they used the results from the trial that gave the most detailed accounts of regimen and resource use. The authors considered the difference between the primary studies, and found that the patient population in the study used to derive Foscan-PDT outcomes had a worse prognosis than those of the other groups, because for these patients all other treatments had failed. As the methods used to identify the trials for this study were not reported, it is difficult to assess whether the best available evidence has been used.

Validity of estimate of measure of benefit
The estimation of benefits was directly obtained from the review of the literature review. The reader is thus referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
All the categories of cost relevant to the hospital perspective adopted were included in the analysis, as were all the relevant costs for each category. The costs and the quantities were reported separately, and the unit costs for each resource item were also reported. These facts will greatly enhance the generalisability of the authors’ results. The resource use quantities and unit costs were derived from both expert opinion and published sources. Appropriate sensitivity analyses, using what appear to have been appropriate ranges, were conducted for both resource use and prices. Discounting was not relevant, as all the costs were incurred during less than one year, and was not performed. The price year was reported, which will aid any possible inflation exercises.

Other issues
The authors did not compare their findings with those from other studies because no study has yet investigated the cost-effectiveness of Foscan-PDT. The generalisability to other settings was addressed through the sensitivity analysis and by the thorough breakdown of resource use, unit costs and total costs. The authors do not appear to have presented their
results selectively and their conclusions reflected the scope of the analysis.

The authors reported a number of further limitations. First, the efficacy attributed to palliative chemotherapy was likely to be an overestimate for the Foscan-PDT indicated population, as the main supporting paper for the palliative chemotherapy arm included patients who had been untreated for cancer, while the Foscan group had received treatments and failed. Second, an underestimation of resource use might have occurred across all treatment modalities, especially in consideration of the advanced stage of the disease, in the relevant patient group. However, to negate the effects of under or overestimation, the authors performed a thorough sensitivity analysis. The results of this showed that, for the majority of scenarios, Foscan-PDT continued to dominate.

Implications of the study
The authors found that if Foscan-PDT, rather than palliative chemotherapy, was used on all suitable patients with head and neck cancer in the UK, it would save the National Health Service approximately £6 million a year. The authors also called for further quality of life research in order to facilitate future quality-adjusted life-year analyses in this area.

Source of funding
Funded by a grant from Biolitec Pharma Ltd.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Computer Simulation; Cost-Benefit Analysis; Great Britain; Head and Neck Neoplasms /drug therapy /economics /surgery; Health Care Costs; Humans; Mesoporphyrins /economics /therapeutic use; Models, Econometric; Palliative Care /economics /methods; Photochemotherapy /economics; Research Support, Non-U.S. Gov't; Sensitivity and Specificity; Treatment Outcome

AccessionNumber
22004000422

Date bibliographic record published
31/07/2005

Date abstract record published
31/07/2005