Radiotherapy costs in glioblastoma: a cost effective analysis

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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.

Health technology
Radiotherapy 54 Gy in 30 fractions versus 39 Gy in 13 fractions in the treatment of glioblastoma.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
Patients undergoing radiotherapy for glioblastoma.

Setting
Hospital. The economic study was carried out in Tromso, Norway.

Dates to which data relate
The effectiveness and resource use data were collected during 1987-1990 for group 1 (those receiving 54 Gy) and 1990-92 for group 2 (those receiving 38 Gy). Prices from 1994 were used to present the results.

Source of effectiveness data
Effectiveness data were derived from a single study.

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

Study sample
The study included 29 patients: 9 (7 male) in group 1 (54 Gy in 30 fractions), and 10 (6 male) in group 2 (39 Gy in 13 fractions). The median age was 48 in group 1 and 63 in group 2. Power calculations to determine the sample size were not given.

Study design
The study was a non-randomised trial with historical controls conducted in a single centre in consecutive time periods. The duration of the follow-up was until death (the patient who survived longest did so for 75 months after entry). The loss to follow-up was not stated.
Analysis of effectiveness
The analysis of the clinical study was based on treatments completers only. The primary health outcomes used in the analysis were the median survival and the mean stay in hospital. The patients in group 1 were younger (median, 48 years versus 63 years) and had a high frequency of frontal located tumour than patients in group 2.

Effectiveness results
The median survival was 12 months (range: 8 - 30 months) in group 1, and 7 months (range: 3 - 16 months) in group 2, \( p=0.05 \). The mean stay in hospital was estimated to be 18 days (range: 3 - 46) versus 18 days (range: 0 - 26) in group 1 and 2, respectively.

Clinical conclusions
There appear to be only minor differences in survival between the different treatment modalities in glioblastoma multiforme investigated in the study. However further studies are needed to confirm those results.

Measure of benefits used in the economic analysis
The measure of benefits was the estimate of median survival.

Direct costs
The treatment costs included hospital stay, hospital hotel stay and radiotherapy. Whether the costs were discounted was not stated even though at least one patient survived for longer than 1 year after entry into the study. Quantities were analysed separately from the costs and their source was the retrospective review of records held at the University Hospital of Tromso for the period 1987-1992. The unit costs of a day in hospital were derived from the local price list for 1994, whilst the hospital hotel costs, were based on the institution’s per diem figures for 1994. The unit cost of radiotherapy was derived from data of the National Insurance Administration (NIA). The quantity/cost boundary adopted was the hospital. 1994 price data were used.

Currency
Norwegian kroner (NOK). The conversion rate was 1 = 10.00 NOK. The conversion rate 1 = $1.5 was also referred to in the presentation of results.

Sensitivity analysis
A scenario and threshold analyses were performed, based on the survival benefit, the costs of the service and the utility values attached to the health outcomes.

Estimated benefits used in the economic analysis
The survival (median) was estimated to be 12 months in group 1 and 7 months in group 2.

Cost results
The mean cost of radiotherapy was estimated to be 6,816 (range: 4,099 - 12,106) in group 1 and 4,792 (range: 1,456 - 6,526) in group 2.

Synthesis of costs and benefits
An incremental cost of 4,858 per life year saved resulted from using the strategy in group 1 (54 Gy in 30 fractions, 5 fractions per week) rather than the strategy used for group 2 (39 Gy in 13 fractions, 5 fractions per week). The single factor causing the largest burden to treatment cost was hospitalisation (65%). The percentage of treatment costs due to hospitalisation was lower in group 1 than group 2 (55% versus 77%). This directly led the authors to the result of the
strategy in group 1 being cost-effective (using a threshold of $30,000 per QALY gained) when the true survival advantage is more than 2 months (using a QALY improvement weight of 0.6, the cost per QALY gained turns out to be 20,480). This obtains provided the radiotherapy in group 1 can be performed mainly as an outpatient procedure. Based on the threshold analysis for an acceptable medical treatment (cost per QALY <$30,000), the base case estimate of incremental cost per life year gained by the strategy in group 1 above is associated with an improvement in the quality of life of 0.25, which is considered by the authors to be within the achievable limits.

Authors' conclusions
There are only minor differences in survival between different treatment modalities in glioblastoma multiforme. The prolonged treatment looked cost-effective only when performed in an outpatient setting and the survival benefit is greater than 2 months.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator is clear. Radiography and chemotherapy are the commonly used techniques in the treatment of primary brain tumours.

Validity of estimate of measure of benefit
The estimate of measure of benefit used in the economic analysis may be questionable due to the retrospective design used in the effectiveness/clinical study and its consequent lack of comparability between treatment groups in terms of age, tumour location and time period at which they were treated. All those aspects represent potential sources of bias to the results as the authors themselves acknowledge.

Validity of estimate of costs
The resource quantities were reported separately from costs, although it is not clear whether all relevant costs items were included in the analysis. Given survival times greater than 1 year, the costs incurred from that point onwards should be discounted to account properly for the time preferences of society/patients.

Other issues
The authors' conclusions were justified based on the results of the sensitivity analysis. The issue of generalisability was partly addressed. Note that a comparison with results from other, related studies was reported.

Implications of the study
As the authors stated, prospective, randomised studies with sufficient numbers are needed to obtain valid estimates of the effectiveness and cost-effectiveness of the radiotherapies available to treat patients with glioblastoma multiforme.

Source of funding
None stated.

Bibliographic details

Indexing Status
Subject indexing assigned by CRD

MeSH
Adult; Cost-Benefit Analysis; Costs and Cost Analysis; Glioblastoma /radiotherapy; Middle Aged; Norway; Quality of Life; Radiation Oncology /economics; Radiotherapy /economics; Spinal Neoplasms /radiotherapy; Treatment Outcome