Cost-effectiveness of high-dose MR contrast studies in the evaluation of brain metastases

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
High-dose (cumulative 0.3 mmol/kg) contrast studies in the evaluation of brain metastases.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Cancer patients with radiologic (computed tomography) evidence and symptoms of brain metastases.

Setting
Hospital. The economic study was conducted in Iowa, USA.

Dates to which data relate
Effectiveness data were collected in 1992. Cost data were collected in 1994. No prices were stated.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that included in the effectiveness study.

Study sample
31 consecutive patients with cancer recruited from a phase III clinical trial of a non-ionic gadolinium chelate with radiologic (CT) evidence and/or clinical suggestion of symptomatic brain metastases. 4 patients were excluded from the analysis (2 for excessive motion artifact and 2 for an incomplete study related to machine malfunction), resulting in 27 patients being analysed in the phase III study. The age range was 43-76 years (mean = 61 years). 11 subjects showed evidence of systemic metastases at the time of diagnosis. The follow-up period was 22-26 months. No power calculations were reported. No loss to follow-up was reported.

Study design
Prospective case series.
Analysis of effectiveness
Based on treatment completers only. The primary health outcomes assessed were lesion detection rates and potential benefit due to potential treatment changes. Assessment was by independent reviewers unaware of the contrast dose, clinical history and not involved in the patients’ care.

Effectiveness results
The high-dose MR studies picked up solitary brain lesions in 2 patients where the standard-dose MR had picked up none, multiple lesions in 7 patients where standard MR picked up solitary lesions, and solitary lesions in 1 patient who had previously been diagnosed as having multiple brain lesions. 11 patients were judged to have potential treatment changes as a result of high-dose studies and 4 had actual treatment changes.

Clinical conclusions
High-dose MR is useful in identifying patients who would not benefit from craniotomy.

Measure of benefits used in the economic analysis
Additional lesions detected by the high-dose studies, actual treatment changes and mortality rates. No discounting was stated.

Direct costs
Costs and quantities were analysed but not reported separately. Direct health service costs were considered, namely all costs related to surgery and radiation therapy. The cost for surgical treatment included hospitalisation, nursing, operating room, anaesthesiology, medications (intravenous solutions, antibiotics) and extra days related to the treatment of complications (extra days in intensive care unit, antibiotics). The cost for radiation therapy included the number of radiation treatments, type of simulation procedures and related radiation field changes.

Currency
US dollars ($).

Sensitivity analysis
Not performed.

Estimated benefits used in the economic analysis
A total of 3 craniotomies and two aggressive courses of radiation therapy were avoided in 4 patients because of the additional lesions detected by the high-dose MR studies. High-dose MR did not have a noticeable impact on mortality rates.

Cost results
The cost savings in management (diagnosis and treatment) ranged from $59,490 to $61,518 for all patients, and from $2,203 to $2,278 per patient dependent upon the number of injections (1-2) and the number of visits (1-2).

Synthesis of costs and benefits
There was no formal synthesis. There were savings of around $2,000 per patient and avoided unnecessary intensive therapy.

Authors' conclusions
Based on limited data, the high-dose study seemed to impact positively on the cost-effectiveness of the management of brain metastases. However, because the study had limitations the results need to be confirmed with a larger patient population and a more standardised treatment approach and fee schedule.

**CRD Commentary**
The estimates of treatment changes are valid because decisions were blinded to diagnostic technique. However, the effect of changed decisions on health outcomes was not established. This would need a prospective controlled analysis with follow-up of all patients. The sample size was also too small. Costs were based on the fee schedule of one institution. Most important health service costs were excluded. At this stage, the authors’ conclusions cannot be generalised, but the study is a promising beginning to a larger scale project into the use of MR imaging in the diagnosis of brain metastases.

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**Other publications of related interest**


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