Cost effectiveness and outcome assessment of magnetic resonance imaging in diagnosing cord compression

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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
Using Magnetic Resonance Imaging (MRI) in the diagnosis of spinal cord compression.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing a diagnostic procedure for the diagnosis of metastatic cord compression.

Setting
Hospital. The economic study was carried out in Stanford, USA.

Dates to which data relate
Effectiveness data were obtained from the literature published between 1979 and 1990. No distinction was made between resource use data and cost data. Cost data (hospital-based) were related to the period between 1980 and 1990. The fiscal year was 1991.

Source of effectiveness data
Review of the literature and authors' institutional experience.

Outcomes assessed in the review
The review assessed the sensitivity and specificity of MRI and myelography, and the average risk of becoming non-ambulatory.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
Not stated.
Criteria used to ensure the validity of primary studies
Not stated.

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

Number of primary studies included
Eight studies.

Methods of combining primary studies
Weighted average by the size of the study.

Investigation of differences between primary studies
Differences were not investigated.

Results of the review
The sensitivities and specificities from major comparative studies were:

- 0.92 and 0.90 for MRI, and 0.95 and 0.88 for myelography (Carmody et al.);
- 0.93 and 0.97 for MRI (Li et al.);
- 0.88 and -0.95 for MRI, and 1.0 and -0.88 for myelography (Hagenau et al.).

The average risk of becoming non-ambulatory for patients diagnosed via MRI was 32% and via myelography was 64%.

Methods used to derive estimates of effectiveness
Estimates of effectiveness were also derived from the authors’ experience in the study institution.

Estimates of effectiveness and key assumptions
The authors’ institutional experience revealed that myelography had a delay in diagnosis approximately twice as long as that for MRI.

Measure of benefits used in the economic analysis
Diagnostic efficacy (or utility) of the modalities was mentioned in the study but no summary benefit measure was identified to capture this.

Direct costs
No discounting was performed due to the short time frame of the study. Costing was retrospectively performed on a sample of 46 patients divided equally between pre-MRI and MRI groups. Quantities were not reported separately from the costs. The following range of direct costs was considered: cost of a study (including technical, professional, and total charges for the procedures, hospitalisation, home care, and professional fee), cost of missing a diagnosis, cost of an incorrect diagnosis, and costs of ancillary testing and complications. The perspective adopted in the cost analysis was that of society. Charge data were used to estimate true costs. The source of charge data was mainly the study institution. The date of the price data was 1991. Costs of additional pain and suffering due to delay in diagnosis were not included in the cost analysis because of the complexities and subjectivity involved.
Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
One-way sensitivity analysis was performed varying the assumptions about the utilisation rate of ancillary tests, the costs of hospital stay due to myelography, and the delay in diagnosis for the myelography results.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The average diagnostic cost per patient was $3,664 for the pre-MRI group and $2,283 for the MRI group.

Synthesis of costs and benefits
The cost per diagnostic utility was regarded as the measure of synthesis of costs and benefits (a mathematical formula was used in order to combine the sensitivity and specificity of the studies to determine a diagnostic utility index). The cost per diagnostic utility was estimated to be $8,278 in the pre-MRI era and $4,489 in the MRI era. The sensitivity analysis established that the results were fairly robust to changes in the uncertain parameters.

Authors' conclusions
The authors concluded that "the use of MRI may result in significant economic benefits in diagnosing metastatic cord compression, but further work is needed on physician behaviour and referral patterns with MRI versus myelography as is long term follow-up for potential reduction in patient debility using MRI".

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The internal validity of the estimates of effectiveness can not be objectively assessed due to lack of information around the literature review and the quality assessment of the studies included in the review.

Validity of estimate of costs
Quantities were not reported separately from the costs, however, adequate details of methods of cost estimation were given. The study lacked a prospective cost analysis.

Other issues
Given the lack of information regarding the literature review and quality assessment of the studies included in the review, and the lack of a prospective cost analysis, the results need to be treated with some caution.

Source of funding
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