Cost-effectiveness of lumbar discectomy for the treatment of herniated intervertebral disc

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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
Lumbar discectomy for the treatment of herniated intervertebral disc.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
Patients who still experienced radicular pain and had herniated lumbar discs myelogram after initial medical management. Most patients experienced sensory, reflex, or motor deficits and had abnormal straight leg raise findings on physical examination. Patients with early improvements and those with severe or rapidly progressive neurologic deficits were excluded.

Setting
Hospital. The study was carried out in Washington, USA.

Dates to which data relate
Effectiveness data were collected from 3 studies published between 1983 and 1993. Quality of life data were collected from a study published in 1993. Resource use and cost data were collected from two 1992 sources. The price year was 1993.

Source of effectiveness data
Effectiveness data were derived from a review of the literature.

Modelling
An effectiveness model was used incorporating the probability of potential outcomes after medical treatment or disc destruction and associated quality of life values.

Outcomes assessed in the review
The review assessed the following outcomes: self-assessed level of recovery, number and timing of operations, frequency of computed tomography scans and magnetic resonance imaging, and quality of life values.

Study designs and other criteria for inclusion in the review
Effectiveness data were collected from two randomised controlled trials and one cohort study.

**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**
Individual data were used.

**Number of primary studies included**
Three primary studies were included.

**Methods of combining primary studies**
Narrative method.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
Patients treated with surgical discectomy or chemonucleolysis experience faster improvement than patients treated medically.

During the year after diagnosis, 8% of medical patients had late operations, and 7% of surgical patients had second operations.

Patients in the medical cohort were slightly more likely to have undergone a computed tomography scan, while those in the surgical cohort were more likely to have had magnetic resonance imaging.

The probability of a good outcome varied between 0.36 and 0.56 after medical treatment and between 0.64 and 0.70 after discectomy.

The probability of a fair outcome varied between 0.36 and 0.42 after medical treatment and between 0.16 and 0.29 after discectomy.

The probability of a poor outcome varied between 0.06 and 0.20 after medical treatment and between 0.07 and 0.14 after discectomy.

The probability of a bad outcome varied between 0 and 0.05 after medical treatment and was 0 after discectomy.

Quality of life values associated with a good outcome were 0.95, with a fair outcome were 0.77, with a poor outcome were 0.62, and with a bad outcome were 0.5.

**Methods used to derive estimates of effectiveness**
Estimates of effectiveness were derived from expert opinion. A survey of 42 surgeons was undertaken.
Estimates of effectiveness and key assumptions
Not reported.

Measure of benefits used in the economic analysis
Quality-adjusted life years (QALYs) were used as the measure of benefits. Utility values were derived from 45-59 year old subjects using the time trade-off method. Benefits were discounted at an annual rate of 5%.

Direct costs
Direct costs were not discounted. Quantities and costs were reported separately. Direct costs reflected costs for all services related to disc herniation (patient visits, diagnostic tests, procedures and hospitalisations). The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Costs and rates of service utilisation were derived from MEDSTAT (January 1987 - December 1989) and data on 78 patients diagnosed at an HMO. Costs were adjusted to 1993 using the medical component of the Consumer Price Index.

Statistical analysis of costs
Not reported.

Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were conducted on efficacy (+/- 25%), quality of life (+/- 50%), and costs.

Estimated benefits used in the economic analysis
During the 10 years after surgery, the average surgical patient experienced 8.7 QALYs while the average medical patient experienced 8.27 QALYs. When benefits were discounted, the improvement in QALYs fell to 0.37.

Cost results
Total costs for the 18-month interval beginning 6 months before diagnosis were $17,020 for the surgical group compared with $4,470 for the medical group.

Synthesis of costs and benefits
The non-discounted cost-effectiveness of surgical over medical therapy was $29,200 per QALY. The discounted cost-effectiveness was $33,900. Cost-effectiveness of discectomy remains less than $100,000 as long as surgery produces an incremental quality-adjusted benefit of at least 0.125 years.

Authors' conclusions
For carefully selected patients with herniated discs, surgical discectomy is a cost-effective treatment. Its favourable cost-effectiveness results from its substantial effect on quality of life coupled with moderate costs.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used, namely two currently available treatment options. You, as a user of this database, should decide if these health technologies are relevant to your own setting.

**Validity of estimate of measure of benefit**

The authors did not state that a systematic review of the literature had been undertaken although the methods and conduct of the review were satisfactorily reported. Effectiveness estimates were combined using narrative methods. Effectiveness data were collected from different subjects and then combined. Estimation of benefits was modelled. The instrument used to derive the measure of benefits, the time trade-off method, was appropriate.

**Validity of estimate of costs**

All categories of costs relevant to the perspective adopted were included in the analysis. The authors were unable to assess costs incurred more than one year after diagnosis from the MEDSTAT database. Quantities and costs were reported separately. A sensitivity analysis was conducted on prices, but not on costs. Charges were used to proxy prices, which limits the generalisability of the results. The price year was reported.

**Other issues**

The authors did make appropriate comparisons of their findings with those from other studies. However, the issue of generalisability of the study results to other settings was not addressed. The authors did not present their results selectively. The study analysed patients with herniated lumbar discs unresponsive to initial medical management and this was reflected in the authors' conclusions. Estimates of work disability potentially averted through the use of more highly effective treatment were not explicitly added to the analysis. Efficacy estimates relate to the 1970s and 1980s, and the effectiveness of surgical and medical treatment may have changed since then. The authors also relied on first year chemonucleolysis data to estimate the early benefits of surgery.

**Implications of the study**

Discectomy can be made even more cost-effective by decreasing the use of diagnostic tests and lowering surgical costs. These findings only apply to carefully selected patients with clearly defined indications for surgery.

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