Cost-utility analysis of routine neurosurgical spinal surgery

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
Patients suffering from cervical or lumbar radicular pain were given routine neurosurgical spinal surgery. The cervical spine treatment included anterior decompression of the nerve roots to treat herniated disc or spondylosis and decompression of the cervical cord. The lumbar spine treatment included decompression of the lumbar nerve roots to treat herniated disc or spondylosis and posterior intervertebral fusion to treat instability-related pain. No comparator was specified but, for both diseases, it was implicitly no treatment.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
The study population comprised patients suffering from cervical or lumbar radicular pain who were undergoing neurological spinal surgery.

Setting
The setting was secondary care. The economic study was carried out in Helsinki, Finland.

Dates to which data relate
In terms of the effectiveness evidence, patients were recruited between 2002 and 2003, but the end point for the effectiveness evidence was not given. The dates for the resource evidence were the same as for the effectiveness evidence. No price year was given.

Link between effectiveness and cost data
The costs were collected prospectively for the same patients from whom the effectiveness evidence was derived.

Study sample
The use of power calculations to justify the sample size was not reported. The sample was selected by convenience, whereby all patients with the characteristics of the disease and the treatment were invited to participate in the study. Of the 546 patients invited to participate, 381 (70%) agreed. Of these 381 patients, 169 had a cervical spine intervention and 101 had a lumbar spine intervention. The rest had miscellaneous interventions.

Study design
This was a case-series study in which the patients were followed up for 3 months after the intervention. The outcomes
for no intervention were assumed to be the same as the quality of life scores before the intervention.

Analysis of effectiveness
The change in the health-related quality of life (HRQOL) score, as measured by the 15D questionnaire, was used to measure the effectiveness. Details of the questionnaire have been given in another study (Sintonen 2001 see 'Other Publications of Related Interest' below for bibliographic details). There were complete data for 270 patients (169 with cervical pain and 101 with lumbar pain).

Effectiveness results
When patients had to wait less than 60 days for surgery, the HRQOL at 3 months after surgery increased by 0.05 for patients with cervical pain and by 0.08 for patients with lumbar pain.

When patients had to wait more than 60 days for surgery, the HRQOL at 3 months after surgery increased by 0.02 for patients with cervical pain and by 0.05 for patients with lumbar pain.

Clinical conclusions
The authors concluded that the intervention improved the patients' health, and that the improvement was much greater if surgery was not delayed by more than 60 days.

Measure of benefits used in the economic analysis
The measure of benefit used was the quality-adjusted life-years (QALYs). The change in the HRQOL score, as measured by the 15D questionnaire, was evaluated. Quality of life data were collected before the operations and 3 months afterwards. The benefits were assumed to last until the end of the patient's statistical life expectancy. A discount rate of 5% was used.

Direct costs
The direct costs used in the analysis were those of the hospital. They were not broken down into components but included both inpatient and outpatient costs. The costs evaluated were those of the treatment, so costs incurred with no treatment were assumed to be zero. The source of the cost data was a database that routinely stores treatment costs of individual patients. The costs were not discounted and the time over which the costs were collated was not stated, although the timeframe might have been similar to that for the collection of quality of life data. The price year was not reported. The resource quantities and the costs were not reported separately.

Statistical analysis of costs
Mean costs and standard deviations were reported.

Indirect Costs
The authors did not include productivity costs as the study took the economic perspective of the hospital.

Currency
Euros (EUR).

Sensitivity analysis
The authors varied the discount rate from 0 to 5%.
Estimated benefits used in the economic analysis

Whilst not stated clearly in the paper, it seems that 1.21 (+/- 2.97) QALYs were gained per person from the cervical interventions and 2.01 (+/- 2.96) QALYs were gained per person from the lumbar interventions.

The side effects of treatment would have been taken into account when calculating the QALYs. The utility scores increased more for those who waited less than 60 days to undergo surgery than for those who waited longer than 60 days.

Cost results

The mean cost was EUR 3,356 (95% confidence interval, CI: 3,265 to -3,448) for patients undergoing cervical surgery and EUR 3,493 (95% CI: 3,007 to 3,979) for those undergoing lumbar surgery.

When surgery took place within 60 days, the costs were EUR 3,347.

The costs were slightly higher for patients who had to wait for longer than 60 days for both cervical and lumbar interventions.

The costs of adverse effects were dealt with in the costing.

Synthesis of costs and benefits

The cost per QALY gained, with no discounting, was EUR 1,738 for patients undergoing lumbar surgery and EUR 2,774 for patients undergoing cervical surgery.

When the discount rate was 1%, the cost per QALY gained was EUR 3,293 for patients undergoing cervical surgery and EUR 2,088 for patients undergoing lumbar surgery.

When the discount rate was 5%, the cost per QALY was EUR 5,816 for patients undergoing cervical surgery and EUR 3,704 for patients undergoing lumbar surgery.

Authors' conclusions

The cost per quality-adjusted life-year (QALY) gained was very reasonable in comparison with that obtained for other commonly accepted treatments.

CRD COMMENTARY - Selection of comparators

The intervention treatments were implicitly compared with no treatment. The authors referred to alternative treatments in the paper. It would have been more appropriate to have included these treatments in the evaluation.

Validity of estimate of measure of effectiveness

The analysis was based on a case-series study. The study sample appears to have been representative of the study population. The authors made a massive assumption that the quality of life of the patients before the treatment would be the same for ever if the intervention was not given. This is unlikely to be true.

Validity of estimate of measure of benefit

The authors used the QALYs gained as their summary measure of health benefit. This measure was derived directly from a single clinical study. The method of deriving the QALYs was adequately reported. In addition to the assumption that the quality of life for patients before treatment would be the outcome of no intervention for ever, the authors also assumed that the improvement in quality of life would last for the patients’ remaining life expectancy. The results should therefore be interpreted with some caution.
Validity of estimate of costs
The perspective taken in the study was that of the hospital. The authors stated that they costed all the hospital resource use, although they did not report the cost items and it was unclear whether average or marginal costs were reported. The cost of no treatment was implicitly considered to be zero, which is unlikely. This means that a full economic evaluation has not really been conducted. The resource quantities and costs were taken from the authors’ setting. The authors stated that the costs were discounted in a sensitivity analysis. Since the authors did not clearly state the time period over which the costs were collected, it is not clear if discounting would have made any difference to the results. The cost data were not reported in detail. In particular, no price year was given, the dates of the resources used were not given, and the unit costs and the resource quantities were not reported separately.

Other issues
The authors made appropriate comparisons of their results with those from other studies and found the quality of life gains to be similar for the interventions considered. However, other studies compared alternative treatments. The issue of generalisability to other settings was not addressed. The authors did not present their results selectively. The authors’ conclusions do not reflect the scope of the analysis in that the authors did not adequately temper their conclusions in light of the poor quality of the evidence towards the incremental benefit of the treatments, and the implicit assumption that the costs of no treatment would be zero.

Implications of the study
The authors regard their study as providing strong evidence in favour of surgery for patients with cervical and lumbar pain disorders. Yet, they admit that there is strong evidence from other studies that "conservative" treatment can be just as effective. It would be useful to conduct a study in which patients with a similar level of pain are randomised to the various alternative treatments in order to determine which treatment produces a lower cost per QALY gained.

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Other publications of related interest
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