The cost effectiveness of surgical versus nonoperative treatment for lumbar disc herniation over two years: evidence from the Spine Patient Outcomes Research Trial (SPORT)

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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.

CRD summary
This study examined the cost-effectiveness of surgery (standard open discectomy) versus nonsurgical care for patients with a confirmed diagnosis of lumbar intervertebral disc herniation. The authors concluded that surgery was moderately cost-effective compared with nonsurgical management, from the societal perspective, in the general population. The study was well described and the methods were valid. The authors’ conclusions are robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of surgery (standard open discectomy) versus nonsurgical care in patients with a confirmed diagnosis of lumbar intervertebral disc herniation.

Interventions
The surgical approach was standard open laminotomy or laminectomy with the removal of the herniation and examination of the involved nerve root. The nonsurgical strategy consisted of usual care that was chosen by the patients and their physicians.

Location/setting
USA/hospital and secondary care.

Methods
Analytical approach:
The analysis was based on a single study with a two-year time horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical evidence came from a published study, namely the Spine Patient Outcomes Research Trial (SPORT), which consisted of an observational cohort and a randomised cohort (Weinstein, et al. 2006, see 'Other Publications of Related Interest' below for bibliographic details). The data from these two cohorts were pooled using regression models for longitudinal data, with generalised estimating equations. The total sample consisted of 1,191 participants, with 775 (mean age 40.7 years ± 10.8; 44% women) in the surgery group and 416 (mean age 43.8 years ± 12.1; 41% women) in the nonsurgical group. The length of follow-up was two years. The impact of potential confounders was taken into account in the longitudinal regression. The key clinical outcome was the impact of the two strategies on health-related quality of life.

Monetary benefit and utility valuations:
The utility values were from the sample of patients enrolled in the clinical trial, which used the European Quality of life (EQ-5D) questionnaire, with US scoring, at baseline, six weeks, three, and six months, and one, and two years.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 3%.
Cost data:
The economic analysis included the treatment costs and the indirect costs. The treatment costs included health care visits, diagnostic tests, medications, surgery, and other health care services such as injections, emergency room visits, or rehabilitation. The indirect costs were those of missed work, unpaid caregiver time, and missed housekeeping. The resource use data were the actual consumption of services in the sample of patients included in the clinical trial and these were collected by patient recall at the follow-up sessions. The recall time was six weeks for the first two follow-ups and one month for the last three follow-ups. The direct medical costs were based on Medicare reimbursement rates, in one scenario, and on average wholesale prices, in another scenario. The medication costs were based on Red Book prices and the indirect costs were estimated using the standard human capital approach and gross wages. The costs were in US dollars ($) and the price year was 2004. A 3% annual discount rate was applied.

Analysis of uncertainty:
A bootstrapping method was used to generate the average cost-utility ratios and their confidence intervals. A deterministic sensitivity analysis was carried out, focusing on variations in the cost assumptions.

Results
The total mean QALYs were 1.64 (95% CI 1.62 to 1.67) in the surgery group and 1.44 (95% CI 1.41 to 1.47) in the nonsurgical group. The difference of 0.21 (95% CI 0.16 to 0.25) was statistically significant.

The total mean costs were $27,341 (95% CI 25,882 to 28,799) in the surgery group and $13,108 (95% CI 11,244 to 14,902) in the nonsurgical group. This difference was mainly due to the cost of the surgical intervention. The indirect costs were 26% of total costs in the surgery group and 57% in the nonsurgical group.

The incremental cost per QALY gained with surgery compared with no surgery was $69,403 (95% CI 49,523 to 94,999). In a population of patients aged 65 years or older, using the Medicare accounting system, this fell to $34,355. Variations in the cost categories, to include only direct medical costs or direct medical costs plus lost wages, did not alter the conclusions.

Authors' conclusions
The authors concluded that surgery was moderately cost-effective compared with nonsurgical management of lumbar intervertebral disc herniation, from the societal perspective, in the general population.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the surgical strategy was compared with conservative nonsurgical management. No clear description of the nonsurgical strategy was given.

Effectiveness/benefits:
The methods and conduct of the clinical analysis were published elsewhere and only limited information on the SPORT was presented, but the methods appear to have been valid. The authors noted that the pooling of both cohorts was required as there was a lot of crossover within them, but the statistical analyses should have limited the impact of confounders. The study groups were not perfectly matched at baseline, but the regression analysis also took account of this issue. The benefit measure was appropriate for capturing the impact of the interventions on the patients' health and a validated instrument was used. The health utilities were collected at several time points. QALYs can also be compared with the benefits of other health care interventions.

Costs:
The economic analysis was satisfactorily carried out and reported and a breakdown of cost items was given. The calculation for the surgery costs was appropriately reported. An alternative cost accounting system was considered for older patients, whose expenses were fully covered by Medicare. The price year and discounting were reported. A good feature of the economic analysis was the inclusion of the indirect costs, but a potential drawback was the use of self-reported resource use and productivity losses. The authors reduced the recall time to achieve accurate estimates. The estimated costs were also reported without indirect costs. The impact of individual cost items on the total costs was analysed and discussed.
Analysis and results:
A synthesis of the costs and benefits was appropriately carried out in an incremental analysis and the findings were clearly reported. The issue of uncertainty was satisfactorily investigated in stochastic analysis. The authors noted that a significant positive feature of their analysis was the use of clinical and economic data from a single sample of patients, who were followed-up for a relevant period of time, avoiding the need for modelling, assumptions, and mixed data sources. The main limitation, as they acknowledged, was the use of data from both an observational and a randomised cohort.

Concluding remarks:
The study was well described and the methods were valid. The authors’ conclusions are robust.

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