The 2-year cost-effectiveness of 3 options to treat lumbar spinal stenosis patients

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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
The aim was to evaluate the cost-effectiveness of three treatments for lumbar spinal stenosis. The authors concluded that minimally invasive lumbar decompression was a cost-effective treatment. The study was not well reported, and the model evidence was limited and associated with considerable uncertainty. The authors’ conclusions were not fully supported by the analysis.

Type of economic evaluation
Cost-utility analysis

Study objective
The aim was to evaluate the cost-effectiveness of three treatments for lumbar spinal stenosis.

Interventions
Physical therapy with epidural steroid injections was compared with major surgical decompression of the lumbar spine with or without fusion, and minimally invasive lumbar decompression procedure.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The cost-effectiveness analysis was based on published clinical data. A decision tree was constructed to model the occurrence of complications, death and repeat surgery. The time horizon was two years. The authors stated that the perspective was that of the Medicare payer.

Effectiveness data:
The treatment effectiveness data were minor and major complications, further treatment, and death. It was assumed that if there was no or minimal relief, or the symptoms returned anytime in the two years after minimally invasive treatment, it had failed and the patient underwent repeat surgery. The incidence of each event was from the published literature.

Monetary benefit and utility valuations:
The quality-adjusted life-years (QALYs) gained, calculated from the utility values, and the time spent in each health state were from the published literature. Because the QALY gain estimates for both epidural steroid injection and surgical decompression were from patients who were less severely affected than those in the model, these estimates were reduced by 25%. The QALY gains for minimally invasive decompression were from four trials of this treatment. The disease-specific outcome, Oswestry Disability Index (ODI), was used in these trials, and a published algorithm was used to convert these scores to SF-6D utility scores.

Measure of benefit:
The measure of benefit was QALYs gained. Benefits were discounted at a rate of 3% per year.

Cost data:
The costs included those of the initial intervention, any repeat or revision procedure, and alternative treatment if the initial treatment failed within two years. Complications that occurred within 90 days of intervention were not assessed.
as most of them were not reimbursed by Medicare. The resource use for each intervention was from the tertiary referral centre's records. The costs were adjusted to the Medicare fee schedule at 2013, where necessary. They were discounted at a rate of 3% per year; the price year was 2013; and they were reported in US $.

Analysis of uncertainty:
One-way sensitivity analyses were conducted to explore the sensitivity of the results to changes in a variable from low to high values.

Results
The study considered $100,000 per QALY gained to be a reasonable cost-effectiveness threshold for the USA.

The average QALYs gained per patient were 0.11 for surgery, 0.12 for minimally invasive decompression, and 0.19 for epidural steroid injection. The average cost per patient was $13,771 for surgery, $5,458 for minimally invasive treatment, and $7,888 for epidural steroid.

Surgery was dominated by the other interventions, as it was less effective and more costly. The incremental cost-effectiveness ratio for epidural steroid compared with minimally invasive treatment was $37,758 per QALY gained.

The model results were only sensitive to varying the number of steroid injections per year. If this was three or fewer, the average cost-effectiveness ratio for the injections was higher than that of minimally invasive lumbar decompression.

Authors' conclusions
The authors concluded that minimally invasive lumbar decompression was a cost-effective treatment for these patients.

CRD commentary
Interventions:
The interventions were clearly defined. The comparators reflected usual practice, which is useful for local decision makers.

Effectiveness/benefits:
The sources of the published evidence for the incidence of complications and death were not well reported. It was unclear how similar the populations were in the studies that provided the evidence for each intervention. There was no indication that a systematic review was undertaken to identify this evidence, so it is not possible to ascertain if the best available evidence was used. The QALY data were from the literature. Strong assumptions were made when adjusting the QALY estimates to reflect the model population. The authors acknowledged that a two-year time horizon was limited, given that lumbar spinal stenosis pain can last a lifetime without treatment.

Costs:
The cost analysis was reasonably well reported. The source for the resource use and unit costs was the tertiary care centre where the study was conducted, so these estimates are likely to have been appropriate. Few details of what was included in the different intervention costs were reported. Limited reporting on the resource use and costs can limit the transferability of the results to other settings.

Analysis and results:
The results were not well interpreted. Minimally invasive lumbar decompression had a higher average cost-effectiveness ratio than epidural steroid injection, so it was considered the optimal strategy. Considering the cost-effectiveness threshold of $100,000 per QALY gained, specified by the authors, the optimal intervention was epidural steroid with an incremental cost-effectiveness ratio of $37,758 per QALY gained. The incremental not the average cost-effectiveness ratio should determine the most cost-effective treatment. The bases for the ranges for the sensitivity analyses were not clear. Since these analyses focused on the changes in the average cost-effectiveness ratios, rather than the incremental ratios, they were of little value. Probability distributions for the model parameters were not specified; the total uncertainty in the cost-effectiveness estimate was not evaluated.

Concluding remarks:
The study was not well reported, and the model evidence was limited and associated with considerable uncertainty. The
authors’ conclusions are not fully supported by the analysis.

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