Transformaminal interbody fusion versus anterior-posterior interbody fusion of the lumbar spine: a financial analysis

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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
A new surgical technique, transformaminal lumbar interbody fusion (TLIF), was investigated for arthrodesis of the lumbar spine, in the treatment of various pathologic conditions.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all patients who elected to undergo surgical intervention for arthrodesis of the lumbar spine, in order to treat various pathologic conditions. No specific inclusion or exclusion criteria were reported.

Setting
The setting was a hospital. The study was carried out in New Orleans, Louisiana, USA.

Dates to which data relate
The effectiveness and resource data were collected between 1994 and 1996 for the APLF group, and between 1996 and 1998 for the TLIF group. The price year was 1998.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Eighty patients undergoing column reconstruction performed by the same surgical team at the authors' institution were included. Of these, 40 underwent APLF and 40 underwent TLIF. In each group patients were divided into 4 diagnostic categories: degenerative disk disease, failed back surgery syndrome, isthmic spondylolisthesis, and degenerative spondylolisthesis. No power calculations were performed to determine study size.

Study design
The study design was a retrospective case-control study carried out in a single centre, the Department of Orthopaedics at the authors' University Medical Centre.
Analysis of effectiveness
The primary health outcomes were surgical variables: operating time, blood loss, blood transfusion, use of the surgical intensive care unit (SICU), and duration of hospitalisation. The TLIF and APLF groups were shown to be comparable in terms of age and gender, but there was no information about the comparability of their clinical characteristics.

Effectiveness results
The average operating times were 307 minutes for the APLF group and 213 minutes for the TLIF group.

The average blood loss was 969 mL for the APLF group and 489 mL for the TLIF group. This difference was statistically significant (P<0.05).

Of the 40 patients in each group, 23 in the APLF group required blood transfusion and received an average of 2.2 units, while only 6 in the TLIF needed blood transfusion and received an average of 1.25 units; the difference was statistically significant, (p<0.05).

Thirty-eight patients in the APLF group were admitted to the SICU with an average stay of 1.4 days, whilst only 2 patients in the TLIF group went to the surgical intensive care unit (SICU) and stayed on average 1 day. However, the authors pointed out that it was a routine procedure for patients undergoing the anterior-posterior surgery to be admitted to the SICU.

The average duration of hospital stay was 6.1 days for the APLF group, compared with 3.3 days for the TLIF group.

Clinical conclusions
The results for the surgical outcomes indicated that the TLIF strategy was more effective than the APLF option.

Measure of benefits used in the economic analysis
No summary benefit measure was used, therefore a cost-consequences analysis was carried out.

Direct costs
The costs were not discounted due to the short timeframe of the analysis, i.e. surgical operation and post-operative hospitalisation time. The quantities and costs of resources were reported separately. The following were included in the analysis: the set fee of the operating room; the cost of supplies used; the implant cost, including pedicle screws, locking nuts, rods, and two titanium surgical mesh cages; and the costs of hospital beds (SICU and ward bed). The quantity/cost boundary adopted was that of the hospital. The quantities and costs were estimated on the basis of the data obtained through the patients' hospital charts. The resources were measured from 1994 to 1998. The price year was 1998.

Statistical analysis of costs
No statistical analysis of costs was carried out.

Indirect Costs
Indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.
Estimated benefits used in the economic analysis
See the effectiveness results reported above.

Cost results
The average cost of the APLF strategy was $49,085 (range: $32,290 - $63,750) and of the TLIF option was $33,784 (range: $27,984 - $42,082). The difference in the average cost to the patient for the procedure was $15,301, which was statistically different, (p<0.05).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
According to the data, the TLIF procedure was cost-effective compared with the APLF procedure, leading to an average saving of approximately $15,000 per admission.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear: it represented the current practice before the advent of instrumentation. You should consider if it is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
No statistical comparison was carried out with respect to patients' clinical characteristics in the two groups. However, an appropriate statistical analysis was performed in order to compare the difference in the results.

Validity of estimate of costs
The resource use estimates were based on actual and detailed data, thus improving the internal validity of the study. Sensitivity analyses would have been useful, in particular to address the issue of generalisability to other settings.

Other issues
The measures used to estimate the effectiveness of the treatments appeared to represent surgical variables more than clinical outcomes. Moreover, these measures were also used as resource units to calculate the total costs of the strategies. No comparisons with other studies were performed.

Implications of the study
The authors recommended the use of the TLIF procedure for arthrodesis of the lumbar spine, for the treatment of various degenerative conditions, tumours and trauma.

Source of funding
None stated.

Bibliographic details

PMID
27984568
11285420

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Aged; Blood Loss, Surgical /statistics & numerical data; Costs and Cost Analysis /economics; Female; Humans; Length of Stay /economics /statistics & numerical data; Lumbar Vertebrae /surgery; Male; Middle Aged; Retrospective Studies; Spinal Diseases /economics /surgery; Spinal Fusion /economics /methods

**AccessionNumber**
22001000902

**Date bibliographic record published**
31/03/2002

**Date abstract record published**
31/03/2002