Cost-Effectiveness of the Cervical Artificial Disc versus Anterior Discectomy and Fusion for the treatment of two-level symptomatic degenerative disc disease: A five year follow-up study

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Introduction

The cervical total disc replacement (cTDR) was developed to treat cervical spondylosis, while preserving motion. While ACDF has been the standard of care for two-level disease, a recent randomized controlled trial (RCT) suggested similar outcomes. Cost-effectiveness (CE) of this intervention has never been elucidated.

Methods

Data was derived from a recent RCT that followed 330 patients over 60-months. Using linear regression, health states were constructed based on the stratification of neck disability index (NDI) and visual analog scale (VAS). Data from SF-12 questionnaires were transformed into utilities using the SF-6D mapping algorithm. Costs were calculated by extracting DRG codes from institutional billing data and then applying 2012 Medicare reimbursement rates. Costs of complications and return-to-work data were also calculated. A Markov model was built to evaluate quality adjusted life years (QALYs) for both treatment groups. The model adopted a third-party payer perspective and applied a 3% annual discount rate.

Results

A strong correlation ($R^2=0.6864$, $P<0.001$) was found by projecting VAS onto NDI. cTDR had an average of 1.58 QALYs after 60-months compared to 1.50 QALYs for ACDF recipients. cTDR was associated with $2,139 greater average cost. The incremental cost effectiveness ratio (ICER) of cTDR compared to ACDF was $24,594 per QALY at two years.

Conclusions

The ICER of cTDR compared with traditional ACDF is lower than the commonly accepted threshold of $50,000 per QALY. This remains true with varying input parameters in a robust sensitivity analysis, reaffirming the stability of the model and the sustainability of this intervention.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of cost-utility analysis for comparing surgical modalities, 2) Discuss, in small groups, the benefits and challenges of the cervical artificial disc when compared to ACDF, and 3) Identify an effective treatment option for multi-level cervical disc disease.

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References

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