Health Economics and the Management of Degenerative Cervical Myelopathy

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KEYWORDS

• Degenerative cervical myelopathy • Health economics • Cervical spine • Surgery
• Cost-effectiveness • Value • Health related quality of life

KEY POINTS

- In the current era of value-based medicine, cost as well as effectiveness must be included when evaluating a medical intervention, particularly for management of degenerative cervical myelopathy where surgery is costly and the demand for interventions is likely to increase with aging demographics.
- The growing body of literature pertaining to the health economics of surgery for degenerative cervical myelopathy supports that surgery is very cost effective compared with nonoperative management.
- Further study is needed to determine which patient subgroups derive the greatest value from surgical intervention and which surgical approaches are the most appropriate from cost and health-related quality-of-life perspectives.

INTRODUCTION

Degenerative cervical myelopathy (DCM) is recognized as the leading cause of spinal cord impairment worldwide.[1] The chronic compressive forces on the cervical spinal cord, which result from osteoarthritic degeneration and/or ligamentous aberrations, lead to neurologic symptoms, functional impairment, and reduced quality of life.[2] The natural history of DCM is variable, but recent multicenter, prospective studies suggest that surgical intervention is associated with improved neurologic symptoms and reduced functional impairment, regardless of disease severity.[3,4] This has, in part, led to a shift in perspective. Within the past 5 years, surgery has been increasingly viewed as a means to improve health-related quality of life (HRQOL) rather than simply to halt disease progression.

Although demonstrably effective for DCM, spine surgery is costly; the interventions rank among some of the most costly surgical procedures.[5]

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Concerns regarding health care sustainability have driven the need to optimize resource allocation and have brought quality and value assessments to the forefront of health policy making. In response, a body of research has emerged on the health economics of surgery for DCM.

It is imperative that spine surgeons remain appraised of value considerations when evaluating commonly performed interventions. This review aims to provide a focused overview of key concepts of health economics pertaining to DCM. This is followed by discussion of research available to guide clinicians and health policy decision makers on the value of surgery for DCM and concludes with comments on important questions that remain to be answered.

KEY HEALTH ECONOMIC CONCEPTS RELATED TO DEGENERATIVE CERVICAL MYELOPATHY

This section provides a brief review of the primary considerations in assessing value, to help frame the subsequent survey of health economic literature on the management of DCM. Specifically, the focus is on defining costs, estimating metrics for HRQOL, and combining cost and HRQOL to estimate value and evaluate cost-effectiveness using willingness-to-pay (WTP) thresholds.

Defining Costs

Costs in health economic evaluations can be classified as either health care costs or non–health care costs.[6] Health care costs include all resources consumed resulting from an intervention. With respect to spinal surgery, these may include the cost of the hospital stay, surgical devices, surgeon remuneration, diagnostic tests, and other costs. At times, microlevel costs from case-costing databases can be challenging to obtain because hospitals often do not publically release these data. As alternatives, investigators may choose to use payment data from public or private insurance plans or else hospital discharge data. Charge amounts from hospital discharge data can serve as proxy measures for health care costs; however, it should be recognized that charges are not synonymous with costs, and cost-to-charge ratios (CCRs) should be applied to provide more accurate estimates.[7,8] Costs outside the health care sector also result from medical interventions, including lost productivity, time costs, child care for patients while undergoing treatment, and others. These non–health care costs are often more difficult to estimate but methods, including the human capital-cost approach and the friction-cost approach, are typically used.[9]

The perspective chosen for an economic analysis determines which costs are included in an analysis. Generally, health economic evaluations in spine surgery can be performed from 1 of 3 perspectives: hospital, payer, or society.[10] The societal perspective is the most inclusive and incorporates all health care and non–health care costs. This perspective is recommended by cost-effectiveness methodological guidelines; however, in many instances the scope of data required is not available.[6] The hospital and payer perspectives are narrower in scope but are the perspectives more commonly used in practice.

A final important cost-related consideration pertains to the timeframe over which the economic evaluation is performed. Typically, in the surgical management of degenerative spinal conditions, the upfront costs are high but subsequent costs are much lower—and may be lower than under medical management. Health outcomes from the intervention are often durable over prolonged periods of time. Thus, it is best to evaluate the intervention over a long time horizon, ideally over a lifetime. This provides the most comprehensive estimation of the relative cost of surgery. Extending the timeframe of evaluation has been noted to substantially change findings regarding cost-effectiveness in the spinal literature.[11]

Evaluating Health-related Quality of Life

HRQOL can be defined using a multitude of metrics. Within the domain of health economics in spinal surgery, HRQOL is often measured as health utility. Health utility ranges from 0 to 1 and reflects a person's health status valuation. These can be measured with direct methods, such as time tradeoff, standard gamble, or magnitude estimation.[12,13] It is more common, however, to use preference-based measures, such as the Short Form (SF)-6D and the EuroQol-5D (EQ-5D). EQ-5D is a 5-dimension instrument that includes mobility, self-care, usual activities, pain/discomfort, and depression/anxiety.[14] The SF-6D is a health utility index derived from the SF-36 health questionnaires.[15] A total of 8 dimensions are covered, including physical function, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions.[16]

Determining Value

Once the cost and health outcomes of an intervention are known, there are 2 common methods of determining value: (1) cost-minimization analysis and (2) cost-effectiveness analysis (CEA) (**Table 1**). A cost minimization analysis is the simpler of the 2