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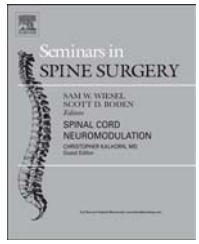

Measuring costs related to spine surgery

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ABSTRACT

Treatment of spinal pathology is a significant contributor to the current rise in health care spending in the United States. To maximize value, the cost of spine care must be analyzed to assess for any inefficiencies. In parallel, outcomes must be tracked to ensure that any potential cost reductions do not have a negative impact on the efficacy of treatments. This article focuses on three primary topics in spinal care. We will begin with a general review of cost analysis methods, highlight specific drivers of cost, and finally offer broad solutions to help improve the value of spine care.

The current rise in health care-related spending in the United States is on an unsustainable course.[1] According to the Centers for Medicare and Medicaid, health care-related spending is projected to grow 1.3 percentage points faster than the GDP. This would result in a projected health care contribution to the overall GDP as high as 20% by 2025.[2] Back and neck conditions account for a large portion of these costs; 12–30% of adults have an active back problem, and approximately 6% of US adults have made an ambulatory visit to a physician for these conditions.[3] An analysis from 2012 estimated that roughly $90 billion is spent on diagnosis and management of low back pain, with an additional $10–$20 billion in estimated economic losses every year.[1]

The Patient Protection and Affordable Care Act (PPACA), along with public, private, and third party purchasers have significantly changed the focus of health care in America from volume to value.[4] Value is defined as health outcomes achieved per dollar spent. In focusing on value, cost reductions need to be measured against treatment outcomes in order to avoid ineffective care.[5] It is also clear that advances in cost control will rely on identifying the various patient-specific and treatment-specific drivers of cost.

In an analysis conducted from 2003 to 2012, laminectomies and spinal fusions were the 2nd and 5th most commonly performed procedures in the US.[6] Moreover, spondylosis was the 11th most expensive condition billed to Medicare. A 2011 study of inpatient costs found that complications from surgical procedures were one of the most expensive conditions covered by Medicare, Medicaid, and private insurance,[7] and we know that treating spinal pathology (even without complications) is one of the most costly endeavors in American health care.[8] If primary cost drivers are successfully identified and minimized, significant cost reductions related to the treatment of spinal pathology can be attained.

The goals of the chapter are threefold. First, we will discuss value and cost in broad terms to establish a means of analyzing cost in spine care. We will then delve into the different factors that contribute to cost and what measures

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have been taken to mitigate these costs. Lastly, we will discuss broad solutions to reduce costs and improve outcomes in spinal care.

1. Defining value in spine care

Value is defined by the customer and is a method of assessing outcomes relative to costs (i.e., value = outcomes/costs). The goal of health care should be to achieve a high value for all patients while simultaneously ensuring the economic sustainability of the entire health care system. All attempts at reducing costs associated with health care should therefore be equally analyzed with concurrent patient outcomes to ensure that this goal is met. It is also important to note that, at times, it is prudent to spend more in certain areas to reduce the need for more costly secondary services. Unfortunately, many present day value incentives are based on inaccurate health care metrics. It is crucial to accurately measure costs and outcomes in order to optimize real world value and produce the best possible patient outcomes.[5]

2. Defining cost in spine care

A basic understanding of health care economics and the methods of analyzing costs are essential to understanding value-based decision-making. The three primary economic studies referenced in analyses of health care costs are cost–benefit analysis (CBA); cost-effectiveness analysis (CEA); and cost–utility analysis (CUA).[9] All of these tests measure results in terms of monetary units but have different outcome measures. Their goal is simple: define which intervention provides the greatest benefit with regard to cost.

Cost–benefit analysis (CBA) uses an outcome measure of dollars and compares two treatments based on their respective monetary values. For example, it compares the cost per patient of abstaining from, versus using, local vancomycin to reduce infections. Using CBA alone is often not appropriate, as it is important to consider more clinically relevant outcomes.[10]

Cost-effectiveness analysis (CEA) is the most commonly used method of economic evaluation. CEA considers only one outcome, which is typically measured in clinical units (i.e., symptom-free days, life years gained, blood pressure, pain, Oswestry Disability Index scores, etc.). Results from CEA are often not generalizable because they only reflect a single measure of health outcomes.

Cost–utility analysis (CUA) is a type of CEA that measures patient outcomes in terms of quality-adjusted life years (QALYs). QALYs measure the number of life years remaining, multiplied by a factor representing quality of life. They range from 0 (death) to 1 (perfect health).[11,12] CUA allows clinicians to compare two different treatments in terms of direct patient outcomes. It also allows a clinician to determine the incremental cost-effectiveness ratio, which represents the incremental benefit between one intervention and the other.[13] CUA is commonly used in assessing the effectiveness of spine surgery; QALYs incorporate length and quality of life, which are the important variables to evaluate when comparing the effectiveness of treatment options (Fig. 1).

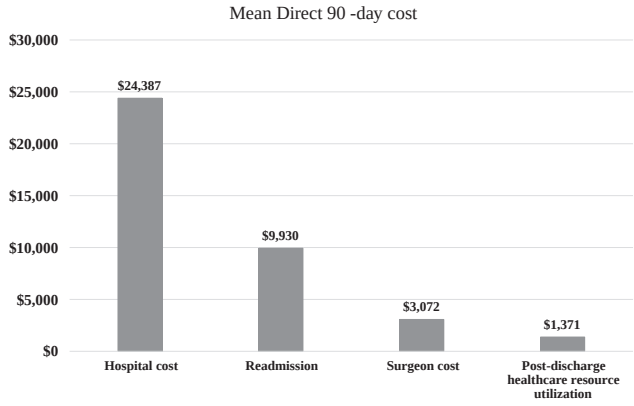

Fig. 1 – Demonstrates breakdown of mean 90-day direct cost for patients undergoing laminectomy and fusion.

3. Cost of spine care

The total cost of spine surgery encompasses a wide timeline and multiple episodes of care. It includes all care from the pre-operative through the post-operative period. Acceptable costs are determined by the involved parties, and interventions are considered cost-effective if the cost per QALY gained falls within society's expected pay threshold.[2] In the United States, 50,000–100,000 dollars/QALY gained is the most commonly referenced figure. This varies significantly from country to country, with a value of 20,000–30,000 pounds/QALY gained in the United Kingdom.[14] There is no well-defined threshold to determine if an intervention is cost effective, and an intervention's cost effectiveness depends upon the payer's perspective.

The numerous cost drivers of spine surgery are divided into indirect and direct costs. Direct costs are quantifiable: they can be sub-grouped into the pre-operative, operative, and post-operative categories. Initial (pre-operative) costs include office visits, non-operative measures prior to surgical intervention, and the ultimate decision to surgically treat the patient's condition. The acute operative period includes hospital fees (Diagnosis Related Groups), surgeon fees (Current Procedural Terminology), resource utilization, and costs of discharge to a facility. Post-operative costs include facility fees, physical therapy, readmissions, post-operative complications, and medication fees. For patients enrolled in single-center prospective registry, the mean total 90-day direct cost for laminectomy and fusion surgery was $28,947 ± $9484. The DRG-based hospital cost for these patients was $24,399 ± $8190. Figure 1 demonstrates the breakdown of mean 90-day cost for patients undergoing laminectomy and fusion. In contrast to direct costs, indirect costs must be estimated, and they measure the burden on society, including patient or family workday losses. Both indirect and direct costs vary widely among different hospitals and practitioners. This variability creates a substantial opportunity for improvement in the cost of spine care with equivalent or improved patient outcomes.[15] We will identify the factors influencing