Clinical Impact of a Value-Based Decision: A Surgical Case Study

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BACKGROUND: Value is an economic utility defined by quality and cost, with the maximum benefit achieved by improving quality and reducing cost simultaneously. Health care systems are using value-based analysis to identify the best practices (BPs) that accomplish this goal.

STUDY DESIGN: We chose a clinical condition, deep venous thrombophlebitis (DVT) to test this hypothesis by identifying the BPs available in the literature; determining the usual practice for DVT prophylaxis at each of 8 hospitals (ie, community, tertiary, and a university hospital) in an integrated system; measuring clinical outcomes (mortality and morbidity) for each hospital; determining cost for each treatment algorithm in each hospital; and measuring the savings opportunity if a single BP was used by all of the hospitals.

RESULTS: The literature suggests that the BPs for DVT prophylaxis consist of sequential compression devices for short-stay procedures; unfractionated heparin for inpatient procedures, and low molecular weight heparin for thrombotic events. Four of the hospitals were using these BPs; the others relied on sequential compression devices and low molecular weight heparin for prophylaxis. Outcomes were identical and value-based analysis suggested a savings opportunity of nearly $4 million if a single BP was adopted.

CONCLUSIONS: There were substantial variations in the type of DVT prophylaxis used by the hospitals with no difference in outcomes. A single BP increased value and resulted in savings of $1.5 million, with a savings opportunity of nearly $4 million. (J Am Coll Surg 2013;216: 800−813. © 2013 by the American College of Surgeons)

The Affordable Care Act of 2010 was passed by Congress and signed into law by President Obama on March 23, 2010. On June 28, 2012, after a period of political rancor, the Affordable Care Act was reaffirmed when the Supreme Court rendered a final decision to uphold the health care law in its entirety.[1] Since then, hospitals and health care organizations have taken steps to sequentially implement the components of the law. To achieve success in this new health care environment, most providers recognize that concepts previously acknowledged but not vigorously pursued are at the vanguard of implementation and compliance. Quality, value, cost, and best practices (BPs) are no longer abstract concepts to consider in a leisurely manner, but are now the imperatives of economic survival for both institutions and physicians.

The concept of value is deeply embedded in the substance of the Affordable Care Act, with no less than 25 provisions that deal directly with this economic utility. Value has become an essential ingredient in health care reform, serving as a bridge between quality and cost. In fact, in its purest economic form, value is defined as a combination (or ratio) of quality and cost, with the maximum end point achieved by improving quality and reducing cost simultaneously, a circumstance rarely achieved because of cost resistance or, even worse, increases in cost. This is no longer an acceptable result. To avoid cost resistance, both variables in the equation (quality and cost) must be analyzed simultaneously (ie, value-based analysis [VBA]) to achieve the greatest clinical impact and opportunity for success.[2]

It is almost a given that physicians must lead this effort because their behavior directly or indirectly affects 85% of health care decisions. Increasingly, BPs are being relied on as the method of choice to impact physician behavior and improve quality. This is a valid strategy if the BP is

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Abbreviations and Acronyms

BP = best practice
C/D = cost per dose
DVT = deep venous thrombophlebitis
LMWH = low molecular weight heparin
OR = operating room
PE = pulmonary embolism
SCD = sequential compression device
UFH = unfractionated heparin
VBA = value-based analysis
VPMA = Vice President of Medical Affairs
VTE = venous thromboembolism

evidence-based and bottom up rather than top down in development. Value-based analysis uses clinical BPs as a key ingredient in defining quality benchmarks.

To initiate the process of VBA in an institution, one should choose clinical programs where differences in cost and quality are relatively easy to measure and BPs are available to guide the process. After discussion among clinical leadership, we chose 5 perioperative variables (ie, preoperative testing, antibiotic prophylaxis, deep venous thrombophlebitis [DVT] prophylaxis, operating room [OR] fluid resuscitation, and OR invasive monitoring) to test the hypothesis that this type of analysis can positively affect both quality and cost.

Deep venous thrombophlebitis was chosen as the first initiative to test for the following reasons: the unpredictable and potentially devastating impact on recovery from surgery; its prevalence within the hospital community; the cost of both prophylaxis and the aftercare of complications, and, perhaps most importantly; the differing approaches and wide swings in the cost of prophylaxis without convincing evidence of the superiority of one approach over the other.

Venous thromboembolism (VTE) is a disease of antiquity. It was first described in the Ebers Papyrus in 1550 BC, however, it was left to Schenk in 1644 to coin the phrase "venous thrombosis" when he observed a thrombus in the inferior vena cava of a patient undergoing autopsy.[3] Rudolf Virchow in 1846 defined the disease when he described the signs and symptoms and pathophysiology of venous thrombosis (Virchow's triad). He reasoned (correctly) that the events leading up to and producing a venous thrombosis included venous stasis, mechanical injury to the intima of the vein, and hypercoagulability.[3] These factors remain relevant today. Deep venous thrombophlebitis is a major cause of death and disability in the United States. The National Center for Health Statistics reported an incidence of DVT in 2006 of 80 cases per 100,000 people, with 25% of these cases being associated with a pulmonary embolism (PE).[4]

In this same report, it was noted that lower extremity DVT resulted in 90% of the reported PE. Others have noted[5,6] that the crucial event in lower extremity DVT is extension into the femoral vein, which occurs about 15% of the time. If unrecognized and untreated, and although 20% will regress,[7,8] at least 25% to 30% will continue to propagate, with a 35% to 50% chance of a PE and a 10% chance of death.[9,10]

The largest and most complete study of the problem was reported in the Longitudinal Investigation of Thromboembolism Etiology, which combined data from 2 cohort studies. Based on data from 6 different communities, 19,293 men and women (without a history of a VTE) were followed for a mean of 8 years (1987 to 1998) with 215 VTE events reported (1.45 per 1,000 person-years) during follow-up.[11]

These data confirm what most surgeons have always suspected, that VTE and, more specifically PE, is a leading, if not the leading, cause of in-hospital death in the United States.[12] And as a corollary, the most common cause of VTE is unrecognized DVT or, even worse, failed DVT prophylaxis. A major challenge in the health care community is to identify the best prophylaxis (quality) at the lowest cost.

METHODS

Identifying the relationship of quality and cost is the essence of VBA and defines its clinical usefulness. Any study that uses VBA must, of necessity, deal with 3 components of care at the same time: the usual practice within the institution; the BPs available in the literature to deal with the issue at hand; and the changes in cost (if any) of replacing the usual practice with the BP.

The methodology required to perform a VBA is heavily dependent on comparing established data drawn from the literature with institutional cost and quality outcomes. Using this approach influences the manner in which data are organized and presented in a VBA report. For example, the literature search to establish a BP becomes part of the methodology of the study as well as a result of the study.

In 2010, we believed that Medstar Health, Inc. would provide the perfect forum to test the concept that a VBA could serve as a useful clinical and economic tool to determine the relevance, quality, and cost of 5 perioperative clinical initiatives. Medstar Health is a large 2-city, multihospital system composed of a university hospital (Georgetown University Hospital), 2 large tertiary teaching hospitals (Washington Hospital Center and Union Memorial Hospital), 2 specialty hospitals (National Rehabilitation Hospital and Good Samaritan Hospital),