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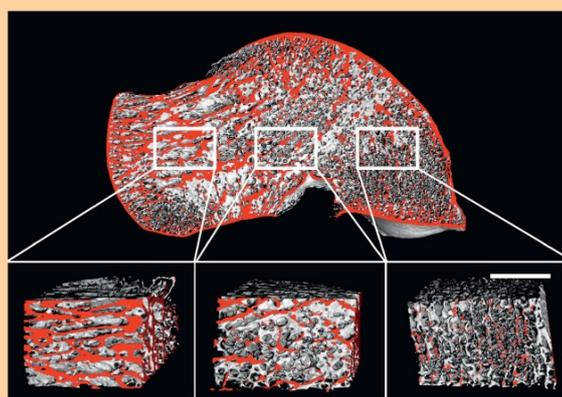
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Health Policy Implications of Outcomes Measurement in Orthopaedics

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Abstract

Background An emphasis on “value” over volume in health care is driving new healthcare measurement, delivery, and payment models. Orthopaedic surgery is a major contributor to healthcare spending and, as such, is the focus of many of these new models.

Where Are We Now? An evaluation of “value” in orthopaedics requires information that has not traditionally been collected as part of routine clinical practice. If value is defined as patient outcomes in relation to healthcare costs, we need to collect information about both [32]. In orthopaedics, patient-reported functional status is not routinely measured, and a poor understanding of the costs associated

with the provision of musculoskeletal care limits our ability to quantify and report on financial measures [10].

Where Do We Need to Go? To improve the value of musculoskeletal care, we need to focus on both improving outcomes and controlling costs. To improve outcomes, orthopaedists must agree on a set of outcome measures for appropriate care and advocate for their collection through the use of registries. Orthopaedic registries in several countries provide best practices for this information collection and sharing [20]. In the United States, we should make comparable investments in registries to measure patient-reported outcomes. To address escalating costs, we need to improve the accuracy of cost data by applying modern cost accounting processes.

How Do We Get There? Orthopaedists should take a leadership position in the promotion and implementation of value-based health care by advocating for the use of registries to measure risk-adjusted patient specific outcomes, negotiating with payors for value-based payment incentives and applying modern cost accounting processes to control costs rather than waiting for public and private payors to define components of the value equation that will affect how orthopaedic surgeons are evaluated and compensated in the future.

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Introduction

Healthcare spending in the United States as a share of Gross Domestic Product is higher than that of any other developed country [6] and continues to outpace inflation [28]. As a result, a changing definition of “value” in the US healthcare industry is emerging as an important driver in healthcare delivery and payment reforms. Both public and

private payor payment policies place increased responsibility on healthcare providers for improving care and controlling costs.

Michael Porter, a renowned health economist from Harvard Business School, has repeatedly argued that “value in healthcare is measured by the outcomes achieved—relative to the cost” [32]. Fundamental to applying this model will be the ability of orthopaedists to measure and compare outcomes as well as costs. In the United States, in specialties such as cancer and solid organ transplantation, in which registries have been mandated, outcomes have improved and provider variation has decreased over time [32]. In other countries such as Sweden, registries have long been used in orthopaedics, and similar improvements in outcomes have been seen. However, in the United States, within orthopaedics, outcomes reporting has historically been cumbersome at the individual provider level, thus preventing its widespread acceptance and use [41].

Although many individual institutions (such as the Mayo Clinic and Kaiser) in the United States have orthopaedic registries, the establishment and spread of multiinstitutional orthopaedic registries have been difficult. Recently, several strong, multiinstitutional registries have been established, and the American Academy of Orthopaedic Surgeons (AAOS) has also rejuvenated its efforts to establish a national joint replacement registry through the implementation of the American Joint Replacement Registry (AJRR). These registries hold great hope for the realization of the measurement and reporting of outcomes that is fundamental to Porter’s value model. In addition, investments in promoting modern cost accounting processes for health care are needed to fulfill the cost component of Porter’s model for value.

The purpose of this review is (1) to summarize the current methods and limitations of outcome measurement; (2) to describe the limitations of currently used cost methodologies; and (3) to discuss new approaches to improving value in orthopaedics. We focus on identifying areas where improvements in measuring outcomes, through the use of registries, and measuring cost, through the use of modern cost accounting systems, can be made to improve value.

Where Are We Now?

Outcome Measurement

Compared with other specialties, orthopaedics lags in using commonly accepted definitions and measures of patient outcomes. Although there are accepted standards of care for surgical interventions, there is not yet widespread agreement on indications for interventions nor are there

accepted measures for the quality of this care. Although the field has widely validated patient specific outcome measures (eg, WOMAC, International Knee Documentation Committee, and others) [2, 7, 16, 21, 37, 42], they are not routinely collected and reported by individual providers [8, 24].

Routine collection of outcomes measures is time-intensive, hampered by legal and regulatory barriers (HIPAA, Common Rule), and limited by patient participation rates. For example, the AAOS in 1994 started a central registry initiative (Musculoskeletal Outcomes Data Evaluation and Management System) but experienced problems because clinicians found collecting the information labor-intensive and costly [41]. The registry was ultimately terminated because of these difficulties.

Today, collecting outcomes data is becoming easier, in part as a result of the widespread availability of electronic data records in medical practices. New registries such as the California Joint Replacement Registry (CJRR) and the Michigan Arthroplasty Registry (MARCQI) are reducing the cost and burden on surgeons by electronically contacting patients and administering outcomes questionnaires. However, cost and participation remain major obstacles to the establishment and spread of registries. Lack of funding, absence of universal device identifiers, the absence of a common set of data definitions, and the lack of a common risk adjustment model are challenges that remain to be addressed on the road to realizing the components of Porter’s model. The establishment of the International Consortium of Orthopaedic Registries, which has broad participation from registries in many countries and is supported in part by the FDA, is an important first step toward agreeing on common data definitions and device identifiers. In addition, the CJRR is developing a risk adjustment model, and regional registries (CJRR, MARCQI, Function and Outcomes Research for Comparative Effectiveness) are collaborating on common data definitions with the AJRR.

Cost Methodologies

A second challenge in calculating “value” in orthopaedics is the lack of reliable cost information. It is difficult for anyone, including consumers, to obtain accurate pricing information for orthopaedic health care services [38]. This is largely the result of the fact that providers do not know the costs associated with the provision of musculoskeletal services, and fee schedules are often considered proprietary. Contributing factors include: gag clauses imposed by device manufacturers, lack of transparency in hospital billing practices, and large variation in the difference between hospital charges and actual payments made by insurance companies [43]. This limits our ability to measure and report financial measures [10].

Additionally, cost accounting methods commonly used within the field have limited our ability to identify cost drivers. Although healthcare organizations have invested in using activity-based costing accounting systems to increase visibility and improve efficiencies of care [5, 25, 50], the time and resource consumption required to implement an activity-based cost accounting system have limited its spread and acceptance in health care and other industries [19].

New Approaches to Improving Value in Orthopaedics

There are promising steps toward encouraging patients and providers to be more value-conscious. Medicare payments for surgeons and hospitals have begun to incorporate “value” measures through their hospital and physician quality programs. In addition, private insurers have “Centers of Excellence” programs that require surgeons and hospitals to collect and report on quality measures to qualify for inclusions in networks.

The Centers for Medicare & Medicaid Services (CMS) is increasing transparency of hospital costs and outcomes by creating a “Hospital Compare” web site designed to help patients compare hospital performance through additional musculoskeletal-specific quality measures: timely and effective care (ie, perioperative antibiotics, venous thromboembolism prophylaxis), readmissions/complications/death (ie, mortality rate after a hip fractures), survey of patient experiences, Medicare volume, and Medicare payments [48]. Although this information is risk-adjusted for patient-specific factors (ie, sex, age, severity of illness scores), social factors such as low socioeconomic status, living situation, race, and social support are not risk-adjusted and are believed to impact these “quality” measures [4].

Private health plans also use outcomes and claims data to structure their provider and hospital network designs. For example, to be included in a health plan’s “Center of Excellence,” provider organizations need to meet specified targets for cost and quality [47]. In addition, many consumer-directed web sites display information on the quality and costs of individual hospitals and surgeons, but information is created from a variety of sources and its accuracy has yet to be determined [29].

Where Do We Need to Go?

Outcomes Measures and Registries

The numerator in our value-based equation would ideally include patient self-reported outcomes that are disease-specific as well as general health status measures. Current

outcomes measures being used by CMS and health plans such as infection rates and surgical complications are important safety indicators but are not adequate to capture whether care is appropriate and effective. Many of these “outcomes” measures are actually process measures that are not adequate substitutes for measuring outcomes [33]. Although these process measures offer payors data that is actionable, unbiased by patient factors and easily collected [40], their validity and correlation with patient outcomes has been called into question [3, 44]. Orthopaedic surgeons should lead their field and develop their own standardized set of indications for interventions and risk-adjusted outcomes measures and seek to be measured by them.

As discussed earlier, orthopaedic registries in several countries provide examples of best practices to collect, measure and compare [20, 22] musculoskeletal condition-specific outcomes. This information has been shown to improve outcomes and increase value for patients and payors but needs to have the support of the entire specialty to be useful and valuable [22]. Establishing registries is resource-intensive and many barriers exist to their formation and operation. However, many registries in the United States and abroad provide examples of how registries have accelerated improvements in care for cardiac surgery, cystic fibrosis, and patients undergoing joint arthroplasty through feedback of performance information and, in some cases, public reporting of results. With the substantial variations in cost and outcomes of orthopaedic services [12, 46], judicious use of provider risk-adjusted patient-reported outcome measures (PROMs) and other performance measures through registries is an important step to increase transparency, improve accountability of providers and assess the value of care.

Improved Cost Methodologies

It is difficult to assess the denominator of our value-based equation if we do not know the real cost of providing care. Although we are currently unable to change antitrust laws and reporting of insurance payments, we can change the way our specialty calculates our costs for delivering care. Although this may not directly decrease cost, it will begin to give orthopaedic surgeons a better idea of what their costs actually are and give them the ability to make changes to control escalating costs.

Kaplan and Anderson [19] created the time-driven activity-based costing (TDABC) model, which better reflects the real time-cost drivers that are experienced in health care. The TDABC system assigns costs by estimating time with standardized time units through each process step along a patient’s medical course [18].

Implementing TDABC into practice offers healthcare managers and physicians the information to help them make operational improvements and identify activities that drive cost.

High-volume outpatient clinics have implemented the TDABC model, which has helped clinic managers find opportunities to improve efficiency and costs [9]. Orthopaedic surgeons should begin to apply modern cost accounting processes to evaluate costs as more sophisticated reimbursement systems evolve from fee-for service models toward bundled payment packages.

How Do We Get There?

Orthopaedic surgeons should take a leadership role in promoting and implementing value-based healthcare policies by advocating for the use of registries to measure risk-adjusted patient-reported outcomes measures, negotiating with payors for value-based payment incentives, and applying modern cost accounting process to evaluate opportunities for controlling costs. Payors and policymakers have already implemented outcomes measures to evaluate orthopaedic surgeons that are not necessarily adequate to capture whether care is appropriate and effective [3, 44]. We urge the orthopaedic community to come together and provide leadership rather than wait for public and private payors to define the components of the value equation that will affect how orthopaedic surgeons are evaluated and compensated in the future.

Required Outcomes Reporting

In other countries, registries are now routinely used to evaluate patient outcomes [27, 34, 35, 39] and have produced excellent results in terms of improving the overall quality of care [15, 17, 23, 36]. However, the costs to establish and operate registries remain a barrier.

Several provisions of the Patient Protection and Affordable Care Act (PPACA) may support the creation of registries. PPACA includes numerous changes to Medicare and Medicaid programs aimed at making healthcare professionals more accountable for cost and outcomes. In fact, by 2017, approximately 9% of Medicare payments to hospitals will be based on reporting and performance of quality metrics. This has elevated the need for surgeons and hospitals to collect and analyze data on quality measures. In addition, private payors also have implemented programs to measure and incentivize providers that meet thresholds for quality and value. These programs require the collection and reporting of long-term clinical outcomes data such as that collected by registries.

The PPACA also authorized the creation of the Patient-Centered Outcomes Research Institute (PCORI) to encourage the collection of patient reported outcomes data. PCORI's funding is expected to increase from USD 50 million in 2011 to USD 650 million by 2014 [30]. This funding surge creates an opportunity for orthopaedic surgeons to perform more patient-centered outcomes-based research to help them decide on the most impactful set of measures. Finally, there are multiple challenges associated with effectively collecting PROMs. Even with electronic methods, keeping in contact with patients for multiple years after their procedures remains a challenge. Although there are examples of registries that are consistently able to collect in excess of 80% of patients' preoperative patient-reported outcomes (PROs), the participation rates at 1 year and after drop significantly, which may severely limit the ability to measure long-term patient-reported outcomes and undermine their effectiveness. However, there are now a range of statistical techniques that can be implemented to adjust for missing data points when patients are lost to followup [11, 26] and it has come into question whether nonresponders really bias overall results [31].

Value-based Payments

Recently, payors have begun incentivizing providers to report and publish their outcomes by driving patients to their care or decreasing reimbursement for low-quality care. We are proposing the creation of a value-based payment program based on providers' performance of risk-adjusted musculoskeletal-specific patient outcomes. Providers will need to be incentivized through significant reimbursement tied to the reporting and publishing of patient outcomes and be rewarded for improving the health status of a patient. However, implementation of a value-based reimbursement system will require a significant investment as other countries have demonstrated [49]. The orthopaedic community needs to negotiate with payors the details of value-based payments and decide how to translate outcome improvements into value-based payment incentives. Ultimately, we hope the surgeons who improve patient outcomes are rewarded [32].

TDABC Model

With the implementation of bundled payments, orthopaedic departments and practices will need to better assess cost drivers and operational inefficiencies in their practice. The Department of Orthopaedic Surgery at Children's Hospital Boston initiated a pilot study using TDABC in pediatric distal radius fractures and found they were able to identify

inefficiencies and had better insight into operational planning [14]; however, they felt implementing the TDABC model took substantial effort and time. Using the TDABC model in every practice environment may not be practical because it takes a substantial amount of time and money to gather data and build the models necessary to derive the time equations for the TDABC model. However, new software programs [1] have now made it easier for healthcare systems and practices to apply the TDABC model.

Discussion

The shift to value-based health care is meant to promote and incentivize high-quality care at the lowest possible cost. To progress to a system that employs the principles of value-based health care, orthopaedic surgeons will need to agree on a set of patient-derived outcome measures and seek to be measured by them through the use of registries as well as better understand the costs of musculoskeletal services. Prior attempts to measure and report value in orthopaedics have been limited to measuring adherence to processes of care and reporting billed charges or reimbursements as a proxy for costs. As a result, we argue that improvements in measuring risk-adjusted patient-derived outcomes, through the use of registries and value-based incentives, and using new cost methodologies, through the use of modern cost accounting systems, need to be developed to effectively evaluate the value of healthcare services in orthopaedics.

Where Are We Now?

In 1999, Swiontkowski et al. published in the *Journal for Bone and Joint Surgery* the symposium article “The Outcomes Movement in Orthopaedic Surgery: Where We Are and Where We Should Go” [45]. Thirteen years later, orthopaedic surgeons are still trying to accomplish these same tasks [45]. Information-sharing of provider performance and new types of payment/delivery systems are modern attempts to help patients and providers become more value-conscious. However, all of these tools are limited in orthopaedic surgery by a lack of emphasis on clinical outcomes and a poor understanding of the costs associated with the provision of musculoskeletal services.

Where Do We Need to Go?

This increased emphasis on reporting of cost and quality measures adds to the imperative for orthopaedic surgeons to take a leadership role in defining value. As discussed,

there are multiple process measures currently being used as “quality” measures but very few validated outcomes measures. Orthopaedists must take the lead in defining what is appropriate care, agreeing on a common set of measures of value and advocating for the profession to collect and report them using registries. Going forward, providers will need to work closely with payors, purchasers, and other public and private agencies to enhance the relevance and accuracy of the information provided in public reporting systems to begin addressing the high variations in outcomes and costs of orthopaedic services.

Also, as new payment programs such as bundled payment systems are used, orthopaedic surgeons should begin to apply new costing methodologies (ie, TDABC) to accurately track and report costs and identify opportunities for cost savings.

How Do We Get There?

Orthopaedists should advocate for transparency about quality and cost by making their own data available through participation in registries. Although registries will not replace the need for studies to assess new technology and randomized controls trials (RCTs), they will provide systematic ways to evaluate whether a procedure is effective when RCTs are difficult to perform and begin evaluating outcomes information to a wide range of orthopaedic patients [13].

There are many limitations to registries. One important limitation is their cost and financing. The Swedish implant registry estimates their cost at USD 40 per patient entry [27]. We argue tracking this information is well worth USD 40 because these data can result in overall quality improvement for the patients and the surgeons as well as provide a reduction in costs by decreasing provider variability and improving patient outcomes. However, these costs need to be recouped through the delivery of higher value care because funding through grants or voluntary donations are not a long-term solution. A second limitation is whether collecting level 3 data (patient-reported outcomes) would be possible on a national scale. Several strong, multiinstitutional registries have already started collecting these data and offer the structures and models for collecting, measuring, and reporting patient-specific outcomes measures in their databases. Finally, we recognize collecting PROMs and using them to evaluate performance will be affected by the lack of a common risk adjustment model, participation rates, patient literacy, socioeconomic status as well as other barriers. However, we believe modern technology and statistics will assist in PROMs still being used as measures of performance and over time by collecting and measuring PROMs we will have a better

understanding of how these various factors affect their performance.

In addition, with the newly passed PPACA and implementation of the AJRR, this is an opportune time for the orthopaedic community to come together and discuss with payors new initiatives that will improve patient outcomes and create value-based payments that are linked to the outcomes we asked to be measured by.

With the implementation of new payment systems, the TDABC model will allow providers the opportunity to find improvements and efficiencies in their current health system while maintaining high quality patient care. Although TDABC may not directly reduce costs, it gives users a tool to measure and find areas of excess capacity and wasteful spending. By implementing these initiatives, the field of orthopaedic surgery will be able to make the changes necessary to improve value and ultimately improve musculoskeletal care.

Conclusion

Progression to value-based health care is happening. The orthopaedic field is primed to be a leader in the conversion of our healthcare system from one that emphasizes and rewards volume of services to one that promotes higher value care. The field already has established patient-centered outcome measures and standardized clinical care pathways to improve outcomes and reduce variability and costs. Our expertise in musculoskeletal care offers us the opportunity to facilitate the type of policies that shift practitioners and payors to measure patient-reported condition-specific outcomes in their practices and recommend providers to also report their outcomes to registries for all orthopaedic interventions. In the absence of strong leadership and input from the clinical community needed to implement these policies and changes, payors, purchasers, and policymakers will continue to drive the value agenda, but not necessarily in a direction that enhances our ability to provide high-quality, patient-centered musculoskeletal care.

We are now in a position to address many of the barriers that limited earlier attempts to establish a similar registry in the United States. The strong track record being established by several regional orthopaedic registries, combined with the new investment by AAOS in the creation of the AJRR, provides a fresh opportunity to lead. Concurrently, orthopaedic surgeons must partner with hospitals and payors to ensure the investments to implement value-based incentives are made and modern cost accounting systems are adopted to better understand cost drivers of procedural services. Armed with consistent outcomes and quality

measures, and appropriate cost accounting methods, Porter's value equation can be realized.

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