Using Financial Incentives to Improve Value in Orthopaedics

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Abstract

Background A variety of reforms to traditional approaches to provider payment and benefit design are being implemented in the United States. There is increasing interest in applying these financial incentives to orthopaedics, although it is unclear whether and to what extent they have been implemented and whether they increase quality or reduce costs.

Questions/purposes We reviewed and discussed physician- and patient-oriented financial incentives being implemented in orthopaedics, key challenges, and prerequisites to payment reform and value-driven payment policy in orthopaedics.

Methods We searched the MEDLINE database using as search terms various provider payment and consumer incentive models. We retrieved a total of 169 articles; none of these studies met the inclusion criteria. For incentive

models known to the authors to be in use in orthopaedics but for which no peer-reviewed literature was found, we searched Google for further information.

Results Provider financial incentives reviewed include payments for reporting, performance, and patient safety and episode payment. Patient incentives include tiered networks, value-based benefit design, reference pricing, and value-based purchasing. Reform of financial incentives for orthopaedic surgery is challenged by (1) lack of a payment/incentive model that has demonstrated reductions in cost trends and (2) the complex interrelation of current pay schemes in today's fragmented environment. Prerequisites to reform include (1) a reliable and complete data infrastructure; (2) new business structures to support cost sharing; and (3) a retooling of patient expectations.

Conclusions There is insufficient literature reporting the effects of various financial incentive models under implementation in orthopaedics to know whether they increase quality or reduce costs. National concerns about cost will continue to drive experimentation, and all anticipated innovations will require improved collaboration and data collection and reporting.

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Introduction

Michael Porter, the prominent Harvard Business School professor, has argued “the central focus [of reform] must be on increasing ‘value’ for patients—the health outcomes achieved per dollar spent” [52]. Porter has looked to employers, who are the major purchasers of healthcare, as important drivers of healthcare reform. However, a fundamental challenge for both public and private sector purchasers of health care has been how to assess whether the vastly expensive healthcare services they contract for

are providing corresponding benefits for workers, their companies, and those supported by publicly financed programs. In an era of persistently high medical cost inflation and the unrelenting promotion of new therapies and technologies of uncertain benefit, purchasers are searching for an economic model that will drive attention to and guide improvement in five key domains of orthopaedic care: (1) cost and resource use; (2) appropriateness of diagnostic and therapeutic interventions (including device selection); (3) patient safety; (4) improved health outcomes, especially functional improvement; and (5) quality of care.

Purchasers of healthcare, including private employers, public agencies, and health insurance plans, broadly see two major ways to drive provider attention to these objectives: financial incentives to clinicians (payment reforms) and financial incentives to patients (benefit design). These tools are being deployed in an experimental mode to find out what mix of provider- and consumer-facing incentives best achieve improvements in the five areas listed. Purchasers recognize, while complementary nonfinancial incentives, such as recognition programs, board certification, and patient-shared decision making, can play an important role, appropriately applied financial incentives provide the greatest opportunity for healthcare improvements.

The purposes of our review are to review and discuss (1) physician- and (2) patient-oriented financial incentive models being implemented to improve value in orthopaedics; (3) key challenges to payment reform in orthopaedics; and (4) prerequisites to implementing value-based healthcare practices in orthopaedics.

Search Strategy and Criteria

Based on knowledge of current healthcare reform plans, we developed a search strategy to investigate how these programs are being implemented in the field of orthopaedics. Physician-oriented incentive models include pay for reporting, pay for performance, episode of care/bundled payment, and pay for patient safety. We queried the MEDLINE database using the PubMed interface. We used a combination of these four physician financial incentive models and the words orthopaedic and orthopedic. For example, we queried pay for reporting using “pay for reporting orthopaedic” and “pay for reporting orthopedic” as a search strategy. We reviewed the retrieved studies looking for US-based articles that reported on experiences or process results based on the implementation of each financial incentive program within a hospital or large group practice setting specific to orthopaedics. We excluded (1) non-US-based studies and (2) studies not describing a hospital or large practice group’s implementation of each financial incentive program within orthopaedics. Using our

search methodology for physician models, we retrieved 150 articles. While several of these studies reviewed and/or investigated the applicability of various performance, quality, and incentive measures within orthopaedics, none strictly met our inclusion criteria (we further describe relevant studies not meeting criteria below). We also conducted a similar search using patient-centered incentive models. We used in combination with the word orthopaedic or orthopedic the following patient-oriented reform model terms: tiered network, value-based benefit design, reference-based pricing, and value-based purchasing. Using this methodology, we retrieved 19 studies, none of which were relevant to patient-oriented benefit design in orthopaedics. As part of our overall search, we reviewed 169 MEDLINE studies. For incentive programs and plans not reported in the primary literature but which the authors knew to be under implementation, we conducted a search on the Google engine (<http://www.google.com>) to further retrieve information on that particular group or organization.

To further ensure all appropriate financial incentive models and their implementation plans had been identified, two of the authors (DL, KJB) held personal communications with experts in healthcare/payment reform. These experts were asked whether they were aware of additional or upcoming financial incentive programs with applicability to the field of orthopaedics.

Financial Incentives to Clinicians

We will review different physician payment models and their implementation in orthopaedics. Public sector agencies, such as Medicare, Medicaid, and state employee programs, are moving more aggressively to implement new clinician payment models. The Massachusetts Special Commission on healthcare costs noted “the importance of moving away from FFS [fee-for-service] as the predominant form of payment” [21], and the federal Patient Protection and Affordable Care Act proposes a wide range of payment changes to hospitals and physicians that reflect value and efficiency, rather than volume [59]. These public policy imperatives are being translated into several approaches of altering physician payment to reflect improvements in quality. Most of these strategies are modest and incremental; they assume continued fee-for-service base payments and layer on financial incentives for additional quality data collection, reporting, and performance.

Pay for Reporting

A search of the literature using our a priori algorithm retrieved 10 articles. None of these studies reported on the

implementation of pay-for-reporting programs in orthopaedics. However, one study investigating the applicability of quality indicators used in pay for reporting concluded there were limitations in current quality metrics [56]. Another study proposed possible quality metrics applicable in a pay-for-reporting system [57]. Despite the lack of evidence, pay for reporting is already being implemented in orthopaedics. Since 2007, the Centers for Medicare & Medicaid Services (CMS) Physician Quality Reporting Initiative (PQRI) program has stipulated physicians participating in Medicare and Medicaid programs are eligible for a 1.5% bonus payment on Medicare/Medicaid claims if they report quality measures for services that have a designated quality measure (10 of the PQRI quality measures relate to orthopaedic practice). Results are not made public. Even the new Physician Compare Web site [50] only indicates whether physicians participate in reporting to the PQRI program, not the actual results they achieve. In 2010, the federal health reform statute renamed the program as the Physician Quality Reporting System (PQRS) and requires the CMS to reduce total payments to those physicians who fail to participate by 1.5% after 2015 and 2% after 2016. Eighteen of the 190 2011 PQRS individual reporting measures apply to orthopaedic surgeons [3] (Appendix 1). As a point of comparison to other specialties, 10 of the 2011 PQRS measures apply to radiology (five for interventional radiologists and five for diagnostic radiologists), three measures apply to anesthesia, and three apply to dermatology [17].

From the purchaser perspective, pay-for-reporting programs served as a useful first step by which physicians and healthcare providers could provide quality data on which they can be graded for the care they provide. Such a framework is the foundation of future pay-for-value programs. Thus, for purchasers, successful pay-for-reporting programs create a data platform of widely accepted, standardized, quality measures that can later be made public and used for payment. However, purchasers have rarely seen pay-for-reporting programs transformed into meaningful pay-for-performance (P4P) programs. As a result, most payment systems, including Medicare, have shifted attention to payment programs that require public disclosure of provider performance and the incentives to actual improvements in quality.

Pay for Performance

In the past 5 years, P4P programs have been introduced as a way to incentivize providers toward improved quality and efficiency of care. Under traditional fee-for-service payment, provider reimbursements are quality blind, and therefore providers continue to be rewarded for clinical productivity regardless of quality or patient outcomes [9].

The CMS has implemented several modest pilot programs in P4P, which are now to be fully implemented as value-based payment programs as part of health reform implementation [26]. In 2003, the Hospital Quality Incentive Demonstration (HQID) was the first major, nationwide P4P initiative. Core performance measures were determined in six clinical areas: acute myocardial infarction, coronary artery bypass graft (CABG), heart failure, pneumonia, and hip and knee arthroplasty [24]. Quality in these areas was assessed by process measures, with hospitals reporting on their compliance with the process measures included in the Surgical Care Improvement Project and the CMS then ranking the hospital based on its performance. Under the HQID, hospitals that fall in the top 10% receive a 2% bonus on their Medicare payment, hospitals in the next 10% receive a 1% bonus, and the rest of the top 50% receive recognition for quality on the CMS Hospital Compare.gov website but no monetary reward. Hospitals not meeting minimum performance thresholds can be penalized as much as 2% of their Medicare reimbursement.

Five-year results from the HQID announced by the CMS in December 2010 suggest P4P initiatives have the potential to improve the quality of care delivered [16]. The CMS reported an 18.3% improvement in the average composite quality score (an aggregate of all process and outcomes measures within each clinical area) over the project's first 5 years. With regard to hip and knee arthroplasty, the CMS reported a 5-year composite quality score improvement from 84.6% to 97.3%. This gain was consistent with improvements in the other processes and outcomes measured, including an improvement in scores from 87.5% to 97.9% for acute myocardial infarction and from 64.5% to 93.8% in heart failure management [53]. However, the CMS noted quality also increased substantially for similar hospitals not participating in the demonstration but which had reported quality information on Hospital Compare.

A search of the literature using “pay for performance orthopaedic” or “pay for performance orthopedic” as search terms retrieved 35 articles. There was no literature reporting on hospital or large-group-based implementation of a P4P program specific to orthopaedics; however, several of the retrieved studies investigated aspects of P4P relevant to its application within orthopaedics. One study [6] analyzed HQID data on hip and knee arthroplasties to determine which factors were associated with receipt of a performance bonus. The authors found top-performing hospitals were specialized in orthopaedic surgery and tended to be teaching hospitals with a high volume of hip and knee arthroplasty. Several studies used large data registries to investigate the applicability of certain quality measures as a marker for performance payment. One study [5] found the CMS-derived markers for quality were poor quality indicators and higher Medicare quality scores were not

associated with lower rates of complication or mortality. Another study [8] evaluating the impact of a commercial payer P4P program related to total joint arthroplasty found the performance measures used were non-evidence-based measures related primarily to utilization of services, and also adherence to the payer-defined guidelines was not associated with improved clinical outcomes or reduced episode-of-care costs. A third study [36] looking at the Surgical Care Improvement Project (SCIP)-1 and Surgical Quality Improvement Program data found adherence to one of the process measures used in performance pay did not affect outcome. In addition, two studies described institutional experiences with applying incentive measures within orthopaedics although they did not report on the implementation of P4P specifically [49, 54]. Both studies emphasized the need to align stakeholder incentives.

Evidence demonstrating the effectiveness of P4P programs has largely been based on studies in primary care and internal medicine, with mixed results [19, 34, 51]. Observational evidence generally suggests a relationship between financial incentives and documented compliance with quality outcome measures [28]. A recent systematic review found, when P4P programs are designed to support uniform minimal standards, they tend to serve their purpose, but when designed to boost performance of providers, positive results are confirmed for only a small number of specific targets such as diabetic care processes [60].

Episode-of-Care or Bundled Payments

While most P4P models provide an economic bonus on top of routine fee-for-service payment, several approaches of current interest reallocate the total payment across a larger provider team to create incentives for coordination and efficient resource use. Bundled payments, also referred to as episode-of-care payments, refers to a single payment to all providers (hospital and physicians) for all care related to a treatment or condition. Final payments are calculated by adjusting the bundle for actual outcomes and/or patient satisfaction [55]. In a healthcare environment where unnecessary tests and procedures may account for 20% of healthcare expenditures, many experts expect bundled payment to feature prominently in future reimbursement schemes [35].

A search of the literature for “episode of care orthopaedic/orthopedic” and “bundled payment orthopaedic/orthopedic” retrieved 98 articles. After a review of these articles, we found none of these studies report on the implementation of bundled-payment programs in orthopaedic practice in the United States. We are aware of several companies and models that calculate bundled payments. We present three of these approaches: Prometheus, ProvenCare, and Integrated Healthcare Association.

Under the Prometheus payment model an evidence-based case rate is created as a base payment. This base payment is then adjusted for patient-specific severity with an allowance for potentially avoidable complications [25]. In a hypothetical payment scheme presented on the Prometheus website, a routine TKA in a patient with comorbidities such as rheumatoid arthritis, obesity, and obstructive sleep apnea is evaluated at \$24,500. This includes all the costs of the surgery, followup physical therapy and rehabilitation, and any other routine care needed. The model also calculates an avoidable complications allowance of \$3500, resulting in a total care budget of \$28,000 [37]. However, in the event of hospital readmission, the additional cost of \$15,000 would cause the provider losses.

Although episode-of-care case rates have been implemented in limited demonstration projects, there is a dearth of evidence suggesting increased healthcare value for this approach. In a 2009 review looking at the likely impact of 12 policy options, RAND Health investigators estimated broad use of the Prometheus model for hospital-based services would reduce spending by only 0.1% between 2010 and 2019 [40].

In 2007, based on the successes of bundled payment for CABG, the Geisinger Health System published results from initial implementation of its program to couple a strong quality performance program with guaranteed pricing, ProvenCare [12]. In several clinical areas, starting with CABG and THA, Geisinger physician leaders developed a program of required clinical practices strongly associated with favorable outcomes. Geisinger surgeons were expected to execute all of the required quality processes, and as their compliance rate approached 100%, Geisinger was able to offer payers a guarantee that any postprocedure complications or readmissions would be addressed at no additional cost. Since the introduction of ProvenCare for THA, Geisinger reports a 3.6% reduction in hospital length of stay, a 58% reduction in 30-day readmission, a 49% reduction in deep venous thrombosis (DVT) rate, and a 67% reduction in pulmonary embolism (PE) rate [11].

Integrated Healthcare Association (California) is working under a \$2.9 million federal grant to implement bundled payment for 10 high-cost procedures performed at California hospitals. Initial effort focuses on episode payment for THA and TKA in commercial Preferred Provider Organization patients between the ages of 18 and 65 years, and the program plans to include the cost of the initial hospitalization and any complications or readmissions that within a 90-day warranty period [44].

Pay for Patient Safety

Patient safety has recently come to the fore as an important marker of quality care not, only because patients should not

be harmed in their routine care, but also because healthcare resources are being poorly utilized to treat preventable conditions and healthcare provider errors. In 2008, the CMS introduced 10 categories of preventable hospital-acquired conditions subject to denial of reimbursement [14]. Categories pertaining to orthopaedic surgery include foreign object retained after surgery; falls and trauma leading to fractures and dislocation; surgical site infection after spine, neck, shoulder, and elbow surgery; and DVT/PE after THA or TKA. In addition to these categories, in 2009, the CMS determined Medicare would also no longer reimburse for wrong surgeries, wrong site, or wrong patient procedures [15].

Our review of the evidence did not reveal any primary literature reporting on the implementation of pay-for-safety programs within orthopaedics; however, there appears to be numerous regional and organizational initiatives designed to better facilitate safe patient care in surgery; examples include checklists, universal protocols, intraoperative time-outs and huddles, and streamlined communication and implementation of electronic records.

As best we can tell, these interventions have not yet led to measurable gains in patient safety, and outside of the major academic centers, the adoption of safety measures has progressed at a slow pace. To this end, the CMS has announced a major national patient safety initiative, the Partnership for Patients [13]. The new initiative will provide financial resources and support to participating institutions as an incentive toward adoption of practices that reduce the rates of hospital-acquired infections and preventable hospital readmissions. Healthcare analysts predict, as the initiative gets underway, Medicare/Medicaid payments will also be linked to public reporting of medical errors.

Financial Incentives to Patients

Several patient-focused financial incentive programs are likely to affect orthopaedic services. Healthcare payors and purchasers seek to recognize and reward efficient, high-quality providers. While they encourage health plans to restructure networks and payments to support provider incentives that align with this interest, they are also exploring ways of directing patients covered by their programs to seek out high-performing physicians and hospitals, particularly for high-cost, high-variation services such as orthopaedics. Purchasers typically can exercise direct influence over patient decisions by providing them with information about performance and by establishing financial incentives that favor the selection of some providers over others.

Tiered Networks and Centers of Excellence

Health plans, at the prodding of purchasers, have identified narrow and tiered networks made up of physicians and surgeons who can be shown to achieve better-quality results and make more efficient use of resources. Purchasers and plans hope to identify high-performing hospitals and doctors and then use modest financial incentives to encourage patients to choose those providers over others. Narrow networks, which require covered patients to seek care from only the listed providers, have not proven to be popular among employers, who are fearful of overly limiting patient choice of provider. Tiered networks, in which visits to preferred providers will involve reduced patient cost sharing, are now being offered by several health plans. These programs are often criticized as economic credentialing, but a 2008 agreement among health plans, medical societies, and the New York Attorney General spelled out requirements for balancing quality and cost in developing such profiles [22]. Some health plans have required either participation in clinical registries or specific levels of quality performance for providers to remain listed in these preferred networks [1].

Value-based Benefit Designs

Shortly after the decline of managed care models in the late 1990s, some argued one solution to escalating healthcare costs was greater consumer responsibility for paying a share of medical costs in the form of higher copayments. With higher cost sharing, it was believed patients would have more “skin in the game” and would therefore only use essential and appropriate care, thereby eliminating overuse and controlling costs [18, 32, 41, 58]. Although increased cost sharing has restrained consumption and cost increases, it has also decreased the use of essential care, including potentially life-saving and preventative care services [29, 48, 64]. Increases in cost sharing can have adverse effects on overall population health as result of the underutilization of essential services [29, 32, 38, 39]. Some now believe cost sharing will lead to higher costs in the future due to hospitalization and complications of patients with more advanced disease who neglect preventative health measures to save money [30].

Many purchasers now favor value-based benefit designs (VBBD) over broad changes in patient cost sharing. To encourage the use of high-value services, employers and insurers lower cost sharing for only those services. Conversely, to discourage the use of undesirable services or those considered to provide little benefit, insurers increase cost sharing [4]. Specific to orthopaedics, a VBBD collaborative effort among Oregon purchasers, health

plans, and hospitals has created a three-tier benefit design in which major orthopaedic procedures face a doubling of cost sharing by the patient while most primary care and routine chronic care services are covered at very low cost [45]. This approach followed on a previous program that required orthopaedic surgeons to submit detailed indications for treatment with any arthroplasty claim, including evidence of advanced joint disease as documented by radiography or other imaging studies, evidence of three failed nonoperative medical management treatment options, and documentation of pain level and functional disability that interferes with activities of daily living.

Reference Pricing for Orthopaedic Services

Another use of benefit design to encourage quality- and cost-conscious patient decisions involves the setting of a reference price above which services will not be eligible for full benefit coverage. In January 2011, the California Public Employees' Retirement System (CalPERS) and Anthem Blue Cross introduced a new benefit design for THAs and TKAs. CalPERS Anthem members are provided with a selected list of 44 California facilities that have historically charged less than \$30,000 for a total joint arthroplasty, on average. If the patient chooses to receive care at a hospital not on the preferred list, the patient may be exposed to all hospital charges above the \$30,000 reference price. By encouraging employees to seek care from providers with moderate total costs, this one coverage change is expected to produce \$17.9 million in savings to the State of California in 2011 [10].

Value-based Purchasing of Orthopaedic Devices

Devices and medical technology represent some of the major drivers of healthcare costs. In particular, the utilization and cost of orthopaedic devices exhibit remarkable variability; such variability undermines the principles of cost-effective and high-value care [47]. The Integrated Healthcare Association began to develop a statewide implant registry in 2007 but was unable to get adequate participation by hospitals, largely due to the lack of interest by affiliated surgeons in more disciplined supply management strategies [43]. Instead, there is growing interest in using benefit design to encourage patients and doctors to select the most appropriate affordable implant when possible. The purchasing and benefit design strategy is expected to mirror the introduction of formularies to

encourage patient selection of generic over branded medications since the mid 1990s [63].

Challenges to Effective Provider Payment Reform

Purchasers and payers are experimenting widely and often targeting orthopaedic surgery with these incentive programs. Pay-for-reporting, P4P, bundled-payment, network design, and shared-savings models are proliferating and show promise but have yet to consistently demonstrate an ability to bend the cost curve or drive substantial quality gains [23, 61]. Perhaps the proportion of compensation at risk has been too small. Perhaps the quality measures have been too traditional and failed to challenge surgeons and hospitals to make meaningful changes. Perhaps the fragmentation that limits clinical reengineering is too great to be overcome by such modest attempts at organizational alignment.

In addition, the current architecture of contracting and payment works against new incentive approaches. Large national insurance carriers find it difficult to run experiments affecting small numbers of surgeons or hospitals. They operate large-scale financial infrastructures and are bound by established provider contracts. Payment rates with hospitals and surgical practices are dictated by market forces—the importance of including a particular institution or practice in a network to attract employers and patients, rather than the intrinsic value of the program. And the largest payer, Medicare, is constrained by statute from taking more than experimental steps to explore payment change. This web of unaligned and conflicting payment arrangements does not send any reliable signal to health-care professionals and institutions that might lead to fundamental reengineering of care.

Prerequisites to Payment Reform in Orthopaedics

While a number of innovative approaches to payment and benefit design are now under discussion, there are several preconditions to broad adoption of these models. Purchasers, plans, and patients are understandably concerned about the potential erosion of clinical quality under any of the models presented in this review. As a result, advocates understand new payment and incentive models require a flow of relevant information to support proposed innovations. We cannot pay for outcomes if we do not measure outcomes. We cannot reward efficiency if we fail to measure the total cost of care across a well-defined episode. We cannot ask consumers to favor high-performing doctors with their business if we are unable to disclose understandable and relevant quality and cost data for the community of providers. As a result, purchasers and

policymakers are keenly interested in the development of a reliable and complete data infrastructure. This is the first prerequisite to payment reform in orthopaedics.

The infrastructure to support effective payment has several parts. We will need professional societies to define practice guidelines that can be mapped to quality measures and support programs like ProvenCare. Those societies should also develop appropriateness criteria for both treatment selection and use of particular implants that can be used to define measures of overuse and resource efficiency. Comparative effectiveness research (CER) can provide information to support such guidelines and appropriateness criteria, and a rich data infrastructure will continuously infuse CER with fresh observational data from community practice. Finally, clinical outcome registries can allow us to measure long-term and patient-reported outcomes [46].

In 2009, multiple stakeholders in California undertook a collaborative to establish the California Joint Replacement Registry (CJRR), a voluntary, statewide registry to track outcomes of patients with joint arthroplasty that aims to capture data on patient preoperative characteristics, prosthetic devices, and patient outcomes, including revision procedures and patient assessments of pain and function [20]. Of particular interest to collaborators in the CJRR is the ability to capture patient-reported outcome measures (PROMs) through longitudinal assessment of patient-reported hip/knee function and satisfaction. PROMs in joint registries have already been successfully implemented in the United Kingdom, Sweden, and New Zealand and are providing clinicians, patients, and payers with more sophisticated information on surgical outcomes. For example, data from the New Zealand Joint Registry where revision rate is published along with PROMs (Oxford knee scores) suggest revision rate alone is much less sensitive than a PROM for clinical failure. Therefore, registries not incorporating PROMs could be prone to overestimate the success rate of TKAs [33].

A second prerequisite to the execution of the financial incentive models presented in this review is the development of new business structures that share risk and responsibility among collaborating clinicians. Bundled payments, accountable-care organizations, and value-based payments will all tie payment to outcomes across a continuum and performance of an array of evidence-based care practices. Execution of these practices and monitoring of long-term outcomes require organizational integration and management authority. Distribution of shared savings and incentive payments across the care team requires new contractual forms.

A final prerequisite to the execution of payment reform in orthopaedics is a retooling of patient expectations. Patients need to understand quality- or cost-blind choices

aggravate our national crisis in healthcare affordability and access. Choosing a hospital that charges \$80,000 over one that charges \$22,000 for a procedure with comparable outcomes sends the wrong signal to the health community and squanders dollars that could be used for wages, improved benefits, or coverage of uninsured Americans. Choosing a hospital that is unaware of its outcomes and of how its patients experience their care or invests little in understanding and implementing best practices rewards mediocrity in our healthcare system. Purchasers, health plans, patients, policy makers, and providers will need to collaborate to build a new system for orthopaedic care that is accountable for outcomes and affordable for all who need it.

Discussion

Enhancing the value of healthcare services is a major goal of healthcare reform. Faced with a shifting landscape of healthcare regulation and payment, providers are increasingly interested in better understanding and navigating the various incentive schemes. In this review, we reviewed and discussed (1) physician- and (2) patient-oriented financial incentive models being implemented to improve value in orthopaedics; (2) key challenges to payment reform in orthopaedics; and (3) prerequisites to implementing value-based healthcare practices in orthopaedics.

The literature and our specific review are subject to a number of limitations. First, we searched the MEDLINE database for hospitals and healthcare systems implementing various payment models in orthopaedics. Healthcare economics and administration topics are less robustly reported in the primary literature; thus, we likely failed to fully capture literature on implementation efforts for various payment and incentive models within orthopaedics. Second, this was not a systematic review of the literature and we used limited search terms that likely constrained the number of articles we were able to review. Third, for additional sources of information, we used Google as a search engine based on the authors' and contacted experts' knowledge of financial models under implementation in orthopaedics. While this represents a broad base of expertise in the field, certain programs or payment schemes may have been omitted.

A major finding from our review of the available literature is that, even though a number of financial incentive models are being implemented in orthopaedics, there is a dearth of primary literature reporting on the implementation, suitability, or applicability of these programs. Greater emphasis should be placed on reporting the results of various payment programs within orthopaedics. P4P appears to be the most widely investigated payment model

within orthopaedics. Despite the engagement of P4P within orthopaedics, P4P measures have been unable to generate value-driven practices in orthopaedics. Why has P4P had such little effect on quality generally and on orthopaedic services specifically? In most P4P programs to date, the proportion of total physician compensation tied to quality performance has been in the 1% to 3% range, and many argue 10% to 20% of payment must be linked to quality to trigger changes in clinical practice [7]. Why have payers taken such a cautious approach to tying payment to quality? Physician leaders have argued measures are not reliable enough to discern superior performance and should not account for a high proportion of payment [27], and payers have generally acquiesced. Orthopaedic patients typically represent a variety of payment programs (government payer/Medicare [32%], managed-care plans [30%], private pay [21%]), and a major proportion are enrolled in the Medicare program [2], which does not provide for any P4P rewards in the traditional fee-for-service program, so the occasional private sector experiment has little effect on overall practice patterns, especially since a single private payer is unlikely to account for a substantial portion of a surgeon's income. Similarly, why has bundled payment fallen short of wide-scale adoption and substantial cost savings? Several providers offering bundled payment for orthopaedic procedures report low interest by commercial health plans in entering into such contracts with provider systems. Payers express concern that bundled payments require one-off negotiations with selected providers and deviate from common contracting models already in place across their large networks. Payers are also concerned that, while bundles may increase the incentives for managing resources efficiently, they may also lead to reduced provider transparency and have little effect on the number of procedures performed.

Purchasers of healthcare services, such as large employers, have greater interest in the episode payment concept but have little ability to design or implement these models without administrative help from health plans.

While providers have traditionally been the focus of reform measures, new programs are demonstrating a marked interest in targeting the healthcare consumer. We reviewed several patient-focused financial incentive models. Patient-oriented incentive models represent permutations of behavioral economic principles geared at directing consumer behavior toward more value-driven practices. Value in this perspective refers to the right care to the right patient at the right time for the right price [42]. As foreshadowed by the Oregon collaborative, orthopaedic surgeons will be increasingly called on to prove the value of certain interventions for each patient. To this end, there needs to be a greater emphasis on CER in orthopaedics. CER provides the platform to compare interventions and determine which

groups of patients most benefit from particular interventions or procedures [31].

Our review of various incentive models suggests no model has shown superiority in achieving large-scale value-based healthcare practices. Further, healthcare measures that have demonstrated favorable results on a small scale are not being transitioned to larger-scale implementation. We identified two major challenges to healthcare reform in orthopaedics: (1) no incentive program has yet shown an ability to bend the cost curve or drive substantial quality gains and (2) the current interrelation of healthcare systems and payments hampers implementation of large-scale or broad-sweeping reform measures. There is no easy solution to overcoming these challenges. Value assessments are inevitably complicated by a myriad of contending stakeholder interests. Reform in healthcare and orthopaedics will require a better alignment of stakeholder incentives [62]. As the system undergoes reform, existing models become less profitable while profit opportunities are created through other avenues [23]. Reform tactics must encourage active stakeholder participation in achieving cost and quality goals.

While looking to overcome these challenges, certain prerequisites need to be operationalized to facilitate effective reform in orthopaedics: (1) reliable and complete data infrastructure; (2) new business structures for cost sharing; and (3) a retooling of patient expectations. These prerequisites are tractable, and as already presented, attempts are currently underway to put them into practice. Leadership within orthopaedics will be needed as reformers navigate our healthcare system through these challenges and prerequisites.

There are a number of physician- and patient-oriented payment models in various stages of implementation in orthopaedics. There is insufficient literature reporting on the implementation of these models. A synthesis of the available data suggests no single approach will prove effective at achieving purchaser goals. There are major challenges to achieving value-driven healthcare practices, but a critical first step to overcoming these challenges is to engage and align the financial incentives of stakeholders. Success at limiting cost growth and improving quality will require new collaborations among healthcare stakeholders, leadership from orthopaedics professional societies, improved data collection and reporting, and messages to patients about appropriate expectations of orthopaedic care. Payment to providers should be aligned with patient information and incentives to increase the likelihood of consistent cost- and quality-conscious behaviors.

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Appendix

2011 Physician Quality Reporting System (Physician Quality Reporting) Measures Applicable to Orthopaedic Surgeons

CMS #	Measure title
20	Perioperative Care: Timing of Antibiotic Prophylaxis—Ordering Physician
21	Perioperative Care: Selection of Prophylactic Antibiotic—First OR Second Generation Cephalosporin
22	Perioperative Care: Discontinuation of Prophylactic Antibiotics (Non-Cardiac Procedures)
23	Perioperative Care: Venous Thromboembolism Prophylaxis (When Indicated in ALL Patients)
24	Osteoporosis: Communication with the Physician Managing Ongoing Care Post Fracture of Hip, Spine, or Distal Radius for Men and Women Aged 50 years and Older
39	Screening or Therapy for Osteoporosis for Women Aged 65 Years and Older
40	Osteoporosis: Management Following Fracture of Hip, Spine, or Distal Radius for Men and Women Aged 50 Years and Older
41	Osteoporosis: Pharmacologic Therapy for Men and Women Aged 50 Years and Older
109	Osteoarthritis: Function and Pain Assessment
126	Diabetic Mellitus: Diabetic Foot and Ankle Care, Peripheral Neuropathy—Neurological Evaluation
127	Diabetic Mellitus: Diabetic Foot and Ankle Care, Ulcer Prevention—Evaluation of Footwear
130	Documentation of Current Medications in the Medical Record
131	Pain Assessment Prior to Initiation of Patient Therapy and Followup
142	Osteoarthritis: Assessment for Use of Antiinflammatory or Analgesic Over-the-Counter Medications
147	Nuclear Medicine: Correlation with Existing Imaging Studies for All Patients Undergoing Bone Scintigraphy
154	Falls: Risk Assessment (2-part Measure with 155)
155	Falls: Plan of Care (2-part Measure with 154)
163	Diabetes Mellitus: Foot Exam

Adapted from the measures, codes, and details in the 2011 Physician Quality Reporting System Measure Specifications Manuals, which are downloadable from the Centers for Medicare&Medicaid Services website (https://www.cms.gov/PQRS/Downloads/2011_PhysQualRptg_MeasuresList_033111.pdf). CMS = Centers for Medicare&Medicaid Service.

References

1. Aetna Inc. Aexcel[®] Specialist Designation in Aetna Performance Network Methodology Guide. Available at: http://www.aetna.com/plansandproducts/health/medical/Aexcel_Methodology_v3_2010.pdf. Accessed January 2011.
2. American Academy of Orthopaedic Surgeons (AAOS). Orthopaedic practice in the U.S. 2008. 2009. Available at: <http://www3.aaos.org/product/productpage.cfm?code=05151>. Accessed September 6, 2011.
3. American Academy of Orthopaedic Surgeons (AAOS). Physician Quality Reporting System (PQRS). 2010. Available at: http://www.aaos.org/research/committee/evidence/pqri_measures.asp. Accessed February 21, 2011.
4. Bach PB. Cost sharing for health care—whose skin? Which game? *N Engl J Med*. 2008;358:411–413.
5. Bhattacharyya T, Freiberg AA, Mehta P, Katz JN, Ferris T. Measuring the report card: the validity of pay-for-performance metrics in orthopedic surgery. *Health Aff (Millwood)*. 2009;28:526–532.
6. Bhattacharyya T, Mehta P, Freiberg AA. Hospital characteristics associated with success in a pay-for-performance program in orthopaedic surgery. *J Bone Joint Surg Am*. 2008;90:1240–1243.
7. Boxall A. Should we expand the use of pay-for-performance in health care? 2009. Available at: <http://www.aph.gov.au/Library/pubs/rp/2009-10/10rp12.pdf>. Accessed January 23, 2011.
8. Bozic KJ, Chiu V. Quality measurement and public reporting in total joint arthroplasty. *J Arthroplasty*. 2008;23:146–149.
9. Bozic KJ, Smith AR, Mauerhan DR. Pay-for-performance in orthopedics: implications for clinical practice. *J Arthroplasty*. 2007;22:8–12.
10. CalPERS. 2011 premium comparison. 2011. Available at: <http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/hbc/201006/item-3a-attach-1.pdf>. Accessed January 2011.
11. Casale A, Michalak DM. ProvenCare CAB. 2010. Available at: http://www.geisinger.org/info/innov_conf/careDeliveryConf/august2010_conf_presentations/pcacute.pdf. Accessed January 2011.
12. Casale AS, Paulus RA, Selna MJ, Doll MC, Bothe AE Jr, McKinley KE, Berry SA, Davis DE, Gilfillan RJ, Hamory BH, Steele GD Jr. “ProvenCareSM”: a provider-driven pay for performance program for acute episodic cardiac surgical care. *Ann Surg*. 2007;246:613–623.
13. Centers for Medicare & Medicaid Innovation. Partnership for Patients. 2011. Available at: <http://innovations.cms.gov/areas-of-focus/patient-care-models/partnerships-for-patients/>. Accessed August 4, 2011.
14. Centers for Medicare & Medicaid Services (CMS). Hospital-acquired conditions (present on admission indicator). 2008. Available at: http://www.cms.gov/HospitalAcqCond/06_Hospital-Acquired_Conditions.asp#TopOfPage. Accessed July 2011.
15. Centers for Medicare & Medicaid Services (CMS). Decision memo for surgery on the wrong patient. 2009. Available at: <http://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=221&ver=17&NcaName=Surgery+on+the+Wrong+Patient&bc=BEAAAAAAEAAA&&fromdb=true>. Accessed July 2011.

16. Centers for Medicare & Medicaid Services (CMS). Medicare demonstrations illustrate benefits in paying for quality health care. 2010. Available at: <http://www.cms.gov/apps/media/press/release.asp?Counter=3882&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&keywordType=All&chkNewsType=1%2C+2%2C+3%2C+4%2C+5&intPage=&showAll=&pYear=&year=&desc=&cboOrder=date>. Accessed January 8, 2011.
17. Centers for Medicare & Medicaid Services (CMS). 2011 Physician Quality Reporting System (Physician Quality Reporting) Measures List. 2010. Available at: https://www.cms.gov/PQRS/Downloads/2011_PhysQualRptg_MeasuresList_033111.pdf. Accessed July 13, 2011.
18. Chernew ME, Newhouse JP. What does the RAND Health Insurance Experiment tell us about the impact of patient cost sharing on health outcomes? *Am J Manag Care*. 2008;14:412-414.
19. Christianson JB, Leatherman S, Sutherland K. Lessons from evaluations of purchaser pay-for-performance programs: a review of the evidence. *Med Care Res Rev*. 2008;65:5S-35S.
20. CJRR Steering Committee. The California Joint Replacement Registry: selecting a tool for evaluating patient reported outcomes (draft) 2010. Available at: <http://www.caljrr.org/pdf/PatientReportedOutcomesBrief.pdf>. Accessed September 12, 2011.
21. Commonwealth of Massachusetts. Massachusetts Division of Health Care Finance and Policy. Recommendations of the Special Commission on the Health Care Payment System. 2009. Available at: <http://www.mass.gov/dhcf/paymentcommission>. Accessed February 15, 2011.
22. Consumer-Purchaser Disclosure Project. Patient charter for physician performance measurement, reporting and tiering program: ensuring transparency, fairness and independent review. 2008. Available at: <http://healthcaredisclosure.org/docs/files/PatientCharter.pdf>. Accessed January 2011.
23. Cutler D. Analysis & commentary: how health care reform must bend cost curve. *Health Aff (Millwood)*. 2010;29:1131-1135.
24. Darr K. The Centers for Medicare and Medicaid Services proposal to pay for performance. *Hosp Top*. 2003;81:30-32.
25. de Brantes F, Rosenthal MB, Painter M. Building a bridge from fragmentation to accountability—the Prometheus Payment model. *N Engl J Med*. 2009;361:1033-1036.
26. Department of Health and Human Services. Medicare Program; Hospital Inpatient Value-Based Purchasing Program. 2011. Available at: www.gpo.gov/fdsys/pkg/FR-2011-01-13/pdf/2011-454.pdf. Accessed February 23, 2011.
27. Dudley RA, Rosenthal MB. Pay for performance: a decision guide for purchasers (final contract report) 2006. Available at: <http://www.ahrq.gov/qual/p4pguide.pdf>. Accessed January 15, 2011.
28. Fairman KA, Curtiss FR. Clinical quality indicators and provider financial incentives: does money matter? *J Manag Care Pharm*. 2010;16:360-366.
29. Fendrick AM, Chernew ME. Value-based insurance design: aligning incentives to bridge the divide between quality improvement and cost containment. *Am J Manag Care*. 2006;12(Spec no):SP5-SP10.
30. Fendrick AM, Chernew ME. Value based insurance design: maintaining a focus on health in an era of cost containment. *Am J Manag Care*. 2009;15:338-343.
31. Fendrick AM, Chernew ME, Levi GW. Value-based insurance design: embracing value over cost alone. *Am J Manag Care*. 2009;15:S277-S283.
32. Gibson TB, Ozminkowski RJ, Goetzel RZ. The effects of prescription drug cost sharing: a review of the evidence. *Am J Manag Care*. 2005;11:730-740.
33. Goodfellow JW, O'Connor JJ, Murray DW. A critique of revision rate as an outcome measure: re-interpretation of knee joint registry data. *J Bone Joint Surg Br*. 2010;92:1628-1631.
34. Greene SE, Nash DB. Pay for performance: an overview of the literature. *Am J Med Qual*. 2009;24:140-163.
35. Griner PF. Payment reform and the mission of academic medical centers. *N Engl J Med*. 2010;363:1784-1786.
36. Hawn MT, Itani KM, Gray SH, Vick CC, Henderson W, Houston TK. Association of timely administration of prophylactic antibiotics for major surgical procedures and surgical site infection. *J Am Coll Surg*. 2008;206:814-819.
37. Health Care Incentives Improvement Institute. Prometheus in practice. 2010. Available at: <http://www.prometheuspayers.org/Documents/Prometheus-Karen-Insert-L4.pdf>. Accessed January 2011.
38. Hsu J, Price M, Huang J, Brand R, Fung V, Hui R, Fireman B, Newhouse JP, Selby JV. Unintended consequences of caps on Medicare drug benefits. *N Engl J Med*. 2006;354:2349-2359.
39. Huskamp HA, Deverka PA, Epstein AM, Epstein RS, McGuigan KA, Frank RG. The effect of incentive-based formularies on prescription-drug utilization and spending. *N Engl J Med*. 2003;349:2224-2232.
40. Hussey PS, Eibner C, Ridgely MS, McGlynn EA. Controlling U.S. health care spending—separating promising from unpromising approaches. *N Engl J Med*. 2009;361:2109-2111.
41. Iglehart JK. Changing health insurance trends. *N Engl J Med*. 2002;347:956-962.
42. Institute of Medicine of the National Academies. The Roundtable on Evidence-Based Medicine. Learning healthcare system concepts v. 2008. Annual report. 2008. Available at: <http://www.iom.edu/~media/Files/Activity%20Files/Quality/VSRT/Learning%20Healthcare%20System%20Concepts%20v2008.pdf>. Accessed September 6, 2011.
43. Integrated Healthcare Association (IHA). Value-based purchasing of medical devices. 2010. Available at: http://www.ih.org/medical_device_vbp.html. Accessed January 2011.
44. Integrated Healthcare Association (IHA). IHA Bundled Episode Payment and Gainsharing Demonstration: Project Description March 14, 2011. 2011. Available at: http://www.ih.org/pdfs/documents/BundledEpisodePaymentPilotProjectDescription_March2011.pdf. Accessed August 4, 2011.
45. Kapowich JM. Oregon's test of value-based insurance design in coverage for state workers. *Health Aff (Millwood)*. 2010;29:2028-2032.
46. Lansky D, Milstein A. Quality measurement in orthopaedics: the purchasers' view. *Clin Orthop Relat Res*. 2009;467:2548-2555.
47. Lerner JC, Fox DM, Nelson T, Reiss JB. The consequence of secret prices: the politics of physician preference items. *Health Aff (Millwood)*. 2008;27:1560-1565.
48. Mager DE, Cox ER. Relationship between generic and preferred-brand prescription copayment differentials and generic fill rate. *Am J Manag Care*. 2007;13:347-352.
49. Marcus RE, Zenty TF 3rd, Adelman HG. Aligning incentives in orthopaedics: opportunities and challenges—the Case Medical Center experience. *Clin Orthop Relat Res*. 2009;467:2525-2534.
50. Medicare. Physician Compare Web site. 2011. Available at: <http://www.medicare.gov/find-a-doctor/provider-search.aspx>. Accessed July 2011.
51. Mehrotra A, Damberg CL, Sorbero ME, Teleki SS. Pay for performance in the hospital setting: what is the state of the evidence? *Am J Med Qual*. 2009;24:19-28.
52. Porter ME. A strategy for health care reform—toward a value-based system. *N Engl J Med*. 2009;361:109-112.
53. Premier Healthcare Alliance. Hospitals in demonstration project continue to improve patient outcomes, provide lessons learned for health reform value-based purchasing program. 2010. Available at: <http://www.premierinc.com/about/news/10-dec/hqid121710.jsp>. Accessed July 12, 2011.

54. Ranawat AS, Koenig JH, Thomas AJ, Krna CD, Shapiro LA. Aligning physician and hospital incentives: the approach at hospital for special surgery. *Clin Orthop Relat Res.* 2009;467:2535–2541.
55. Satin DJ, Miles J. Performance-based bundled payments: potential benefits and burdens. *Minn Med.* 2009;92:33–35.
56. Soohoo NF, Correa B, Pandarinath R. Pitfalls of using performance measures to evaluate the quality of hip fracture care. *Orthopedics.* 2009;32:84.
57. Soohoo NF, Lieberman JR, Farng E, Park S, Jain S, Ko CY. Perioperative quality-of-care measures for patients undergoing total hip or total knee replacement. *J Long Term Eff Med Implants.* 2009;19:249–253.
58. Trivedi AN, Rakowski W, Ayanian JZ. Effect of cost sharing on screening mammography in Medicare health plans. *N Engl J Med.* 2008;358:375–383.
59. US Congress. Section 3001, Patient Protection and Affordable Care Act. HR 3590. 2010. Available at: <http://democrats.senate.gov/reform/patient-protection-affordable-care-act-as-passed.pdf>. Accessed February 15, 2011.
60. Van Herck P, De Smedt D, Annemans L, Remmen R, Rosenthal MB, Sermeus W. Systematic review: effects, design choices, and context of pay-for-performance in health care. *BMC Health Serv Res.* 2010;10:247.
61. Willensky GR. Health economics. *Stud Health Technol Inform.* 2010;153:179–193.
62. Wilson NA, Ranawat A, Nunley R, Bozic KJ. Executive summary: aligning stakeholder incentives in orthopaedics. *Clin Orthop Relat Res.* 2009;467:2521–2524.
63. Wilson NA, Schneller ES, Montgomery K, Bozic KJ. Hip and knee implants: current trends and policy considerations. *Health Aff (Millwood).* 2008;27:1587–1598.
64. Zeber JE, Grazier KL, Valenstein M, Blow FC, Lantz PM. Effect of a medication copayment increase in veterans with schizophrenia. *Am J Manag Care.* 2007;13:335–346.