2014 ABJS Earl McBride Lecture

2014 ABJS Earl McBride Lecture: Disruptive Innovation: Orthopaedics in the 21st Century

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In the book of Ecclesiastes, Solomon wrote: “There is nothing new under the sun.” Despite Solomon’s proclamation, change seems to be the only constant in the practice of 21st century orthopaedics. Generally, our patients benefit from

what some have termed “disruptive innovation”—innovation that disturbs the status quo, the usual manner of business, and/or assumptions that are subsequently disproven.

Clayton Christensen and others [2, 3, 7] have written on the need for disruptive innovation in healthcare for more than a decade. Yet, there are previous examples of innovation that were disruptive to the practice of medicine and orthopaedics before our time. One example is a well-known book-length study by Abraham Flexner written in 1910. The Flexner Report [3], as it is now recognized, revolutionized the standards for medical education and led to certifying bodies in the specialties; thus closing down an entire cottage industry of proprietary medical colleges of dubious quality.

In my lifetime, disruptive innovation has enhanced treatment of musculoskeletal conditions with arthroscopy, total joint replacement, MRI, advanced internal fixation devices, minimally invasive techniques,

and the emerging areas of biologics and gene therapies. We need to look no further than a recent edition of *CORR*® for three examples of disruptive innovation in our profession: The emergence of open access journals and paying to publish [11], the demerit scholarship to weed out marginally bad residents [1], and the development of the sports bra and institution of Title IX’s effect of women’s participation and injuries sustained in athletics [9]. I will leave it up to the reader to decide which is the most disruptive, innovative, or interesting.

The term disruptive has been popularized in another area of our professional life—“the disruptive physician.” This phrase should be more correctly termed “the dangerous physician,” as the behaviors involved place patient safety and teamwork at risk. By contrast, disruptive innovators in medicine should be celebrated. Still, in evolving regulatory, financing, and legal environments, some innovations can have negative consequences for patients seeking access to care.

The disruption in these arenas can have profound effects on the physicians and surgeons who provide access to care for their patients. A recent study by The Physicians Foundation [15] found more than three in four

Note from the Editor-In-Chief:

I am pleased to share with our readers excerpts from the 2014 Association of Bone and Joint Surgeons® Earl McBride Lecture by David D. Teuscher MD, First Vice President of the American Academy of Orthopaedic Surgeons. In his lecture at the 2014 ABJS® Annual Meeting in New York City, Dr. Teuscher offered his take on healthcare’s increasing reliance on “disruptive innovation”—innovation that disturbs the status quo—and its profound effects on orthopaedics, as well as the physicians and surgeons who provide access to care for their patients.

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physicians are pessimistic about the future of the medical profession, 84% agreed that the profession was in decline, most would not recommend medicine as a career, and more than 60% would retire if they had the means. Perhaps the primary focus of innovation should be achieving and sustaining high levels of physician satisfaction that drive better patient outcomes.

Rand's recent study [4] on physician satisfaction commissioned by the American Medical Association (AMA) demonstrated that the factors influencing professional physician satisfaction were the same as those outside of medicine—fair treatment, responsive leadership, attention to work quality, content, and pace. Interestingly, compensation amount was not a factor *per se*, but compensation certainty was; in the twin issues of compensation stability and sustainability.

So what is causing such malaise in our profession? Not surprisingly, an increasing ratio of patient face time to computer face time was highly correlated with physician satisfaction. Electronic medical records a major driver of physician dissatisfaction, making one wonder if we should set new standards for compensation based upon “Meaningless Use Criteria.” Clearly the electronic medical record has not met the lofty promises of efficiency, safety, cost, duplication

control, and interoperability. Some have argued that it is a technology in search of an application. I believe in the potential of electronic medical records, but with a disruptively innovative patient-centric approach that places the ownership of the data in the hands of the individual patient with a smart card technology that already exists. With standardized operability systems in our offices, ORs or emergency departments, a patient could populate the physician's clinical and business records with a swipe and use a PIN or password for protected information access. A cloud-based system could be used to back up the data, allowing emergency access and replenishment of the lost card. This would result in shifting the patient encounter from the high-tech and low-touch current system, to the high-touch interaction that both patients and physicians desire.

Emerging technologies, learner preferences, and limited resources are about to apply another round of disruptive innovation to higher education affecting the physician workforce. The Gartner Hype Cycle for Emerging Technologies [5] follows a characteristic pattern of expectations after an Innovation Trigger leading to a rapid Peak of Inflated Expectations, followed by a fall to a Trough of Disillusionment, leading to an increasing Slope of Enlightenment, and ultimately a

Plateau of Productivity. These “Hype Cycles,” of between 18 months to more than 10 years, are augmenting humans with technology. Examples include an at-risk patient with a wearable computing device monitoring patient compliance with treatment plans and disease control; a cognitive virtual assistant acting as an automated customer representative; or a mobile robot working with a surgical remote team. These trends in human/machine interaction will seek to improve productivity, transform patient and purchaser/payer experience, and produce competitive advantage. What they deliver remains to be seen. Learner preferences in higher education are following the same cycle of emerging technologies, with the latest generation of digital learners demanding hybrid models where the educator and learner are increasingly separated in time and space. Given the limits of restricted resident training hours, these innovative models of concept and skill competency testing to identify opportunity for most effective and time limited educator-learner direct interaction will likely have increasing application in musculoskeletal education.

Despite a large increase in medical school enrollments the past decade and a projected future physician workforce shortage, limited graduate medical education training slots arising from a

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federal funding freeze may lead to competency-based promotion rather than the current time-in-training-based model. This innovation could lead to shorter training times with more certainty of skills developed for independent practice, but its implementation will certainly be disruptive for some. I believe that combinations of skills simulation similar to aviation and individualized learning portfolios will guide the future learner after establishment of baseline skills, designed to build subject mastery leading to readiness for individual and unsupervised practice.

The orthopaedic workforce of the future may be further stratified along two lines that will be quality-driven and value-rewarded. The surgeon of tomorrow with superior technical competency and results based upon risk-stratified outcomes and resource utilization will spend the preponderance of his or her practice in the OR. Parallel to that will be the equally valued and compensated master musculoskeletal diagnostician who will efficiently and effectively answer the three basic questions of every patient: (1) What is wrong with me, if anything? (2) What can you do to solve my problem? (3) What is my prognosis; given the costs, risks and potential harm? Each of those answers rests on the primacy of a prompt and accurate diagnosis. The master diagnostician

will use checklists and clinical decision support tools to avoid cognitive errors, free up mental bandwidth, and improve judgment in lieu of memory. I believe that as we begin to reliably and reproducibly define quality and value in healthcare, these two competencies will be highly valued and rewarded. I do not expect it to fully be implemented soon, but if we are to deliver improved outcomes at lower costs, we will eventually move in this direction.

Similarly, the recertification process may evolve from Maintenance of Certification to Maintenance of Competence. Competency tools could include surgical simulation testing at a remote testing center or expert review of mounted video from the examinee physician-surgeon. I believe competence based testing and learning systems will and should replace the current certification process. The American Board of Orthopaedic Surgeons is already pivoting toward assessment of nontechnical skills, and the arenas of communication skills and patient safety will surely expand as patient and payer demands are met. Patients generally rank their two most important desires as physician manner and physician quality. This is based upon patients' perception in these two highly ranked aspects; choice will affect outcomes importantly and there is great variability in surgeon quality.

How and who defines quality is also in a state of disruptive innovation. But one thing is certain: There is no high-quality patient outcome unless there first was a safe patient encounter. Safety has been a stated goal of our specialty for more than 15 years, yet we have not made a dent in the error rates and safety outcomes [10]. For instance the rate of wrong site surgery is greater than when we began the Sign Your Site program. A decade ago, American Academy of Orthopaedic Surgeons (AAOS) First Vice President, James Herndon addressed patient safety. Recently, I participated in a strategic planning session with the AAOS Council on Research and Quality, Council Chair Kevin Bozic, and Patient Safety Committee Chair William Robb, on that very subject. Let there be no doubt, we are rededicated to advance the cause of patient safety through multiple avenues that are sure to disrupt our profession with the hope of positive innovation and results that benefit all.

Another area ripe for disruptive innovation is in the education of our populous in the economics of health insurance. We have a national collective healthcare economics IQ that does not serve us well. It is time to inform America that the reason you have health insurance is to avoid a financial calamity such as cancer or a car accident, not to access routine care,

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let alone get educated how to take care of yourself. When more than half of the costs of healthcare are preventable and treatable, it is time for a nation with a bill of rights to acquire a bill of personal responsibility.

Lastly, the issue of disruptive innovation in the healthcare value equation, where outcomes divided by costs is the metric. The American Academy of Orthopaedic Surgeons has recently funded and published multiple independent economic analyses [6, 8, 12–14] to determine the economic and noneconomic value of certain services we provide. The results were resoundingly positive for our patients and society; what we do in the operating room is expensive, but far cheaper than denial and rationing of that care. Of the five conditions studied; TKA [14], ACL reconstruction [13], rotator cuff repair [12], herniated lumbar discectomy [8], and hip fracture open reduction and internal fixation [6], the annual projected savings in excess of costs is more than USD 41 billion a year. If we are to be paid for our services in models based on value instead of volume, these are the disruptively innovative facts that we need to make our case. We must now educate our fellow physicians, policy makers, payers, purchasers, and patients. We can improve patient value through better outcomes and lower costs; but education is the key.

Our charge today is that if we, as physician-leaders of the future, are to succeed in these new models of disruptive innovation, we must acquire the skills, experience, and reputation that transform us from team member to team leader. Nontechnical skills in leadership, communications, advocacy, safety, finances, and conflict resolution will be just as important as becoming master diagnosticians and superb surgeons in order to lead the next wave of disruptive innovation for our profession and our patients.

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