

On Disruptive Innovations in Prosthodontics— Can We Hide in Our Operator?

In his recent book *The Innovator's Prescription*, Clayton Christensen outlines his thoughts on health care in the United States and the problems inherent in a business model of patient care that is designed to be complex, and with highly skilled clinicians who practice the art more than the science of health care.¹ The concept of disruptive innovation started with Christensen's work and outlines a series of scenarios where a business can be caught off guard with a rapid change in the market's desire for its product or services. Disruptive innovations have hit many commonly known industries (eg, Kodachrome and digital imaging, mainframe computing and PCs, department stores and Amazon or eBay), converting industries based on complex, highly skilled, resource-intensive technologies into more simplified ones with new business models that provide a lower cost and standardized effective outcomes. Innovations can be a very good thing, but they can also be disruptive while eventually improving the lives of the whole over that of the one.

What are the lessons for prosthodontists in this context? First, it has to be acknowledged immediately that specialists in our discipline practice a combination of art and science that is an intense mixture of diagnostic and technical skill. Then the question must be posed: Will this set up the discipline as one that is highly vulnerable to being disrupted? Consider the following scenario: An entrepreneurial company who conventionally retails flash card memory on the Internet decides to contract manufacture a dental implant that is directly marketed to patients. The patient obtains a prescription from a prosthodontist and purchases the implant online, taking it to her practitioner for placement. Since the implant is on an approved list from the patient's provider, the specialist reviews the medical record and uses the cone beam computed tomography image study to direct a surgical technician to place the device. As the patient has this implant placed, the prosthodontist oversees four other cases simultaneously. Meanwhile, the digital treatment plan is used to copymill a ceramic abutment as well as a provisional crown, which are then placed on the inserted implant—all completed in 20 minutes. Sound far fetched? Not really. This is a model that is already occurring in ophthalmology, where patients can obtain their prescription and go to the provider of their choice for conventional prosthetics (eyeglasses), and

laser-based corneal corrective surgery is mainstreamed under industry-based quality control, providing reproducible results and lower costs.

While the reader may be disturbed by the described concepts in this scenario, we clearly need to be open to new vistas if our specialty is to remain relevant. One overriding issue is the need for our specialty to provide access to tooth replacement therapies in a manner consistent with our heritage. Does this mean we should embrace new technologies? Yes (and no). Technologies that facilitate high-quality care delivery in an expeditious manner and, eventually, at a lower cost should be embraced. Our greatest skill set is the diagnostic assessment, sequencing, and vision of care delivery. The sustainability of our specialty is questionable if we envision that we must also be the technical provider of that care. It is opportune and timely to rethink our approach to advanced training in the discipline, one that has depended so heavily on laboratory training and performance, and all too often to the detriment of biologically related research. If I were to use a musical performance analogy, we must consider the merits of producing virtuoso performers and composers instead of risking the exclusive recruitment of instrument makers.

Another lesson to learn is that our specialty has already played a key role in the development of tooth replacement technologies that are restorative driven with the creation of dental implants, an obvious and very significant innovation. As our clinical experience has increased, our complication rate has declined, with a resultant emphasis now in some circles for a surgical prosthodontic practice experience. While this is a valuable consideration, one cannot help but wonder if this is a symptom of the expression of our specialty becoming cognitively bored with the complex technicalities of conventional prosthodontic practice. As technology continues to evolve, are we playing the appropriate role as diagnostic gatekeeper for our patients by not living up to our biologically driven leadership expectations? For instance, if a patient has congenitally reduced bone mass in the alveolar arch, do we advocate a surgical augmentation and placement of conventional implants, or do we consider smaller-diameter devices, so-called "mini implants?" Do we understand the advantages and challenges of these choices? Can we communicate

these considerations efficiently to our patients? Currently, our choice of a dental implant system reflects an implicit trust in its manufacturer to provide quality in the product and their commitment to the marketplace. In a previous publication,² I made the point that when we choose an implant system, we make a commitment for the patient to the device, its design, and the reputation of the manufacturer, and we make a long-term maintenance commitment that the patient will need to deal with. This is common in the solution-based era of technologic development, where technology is rapidly evolving and continues to respond to market demands (new solutions, surfaces, abutment-implant junction designs, materials, etc). This is a logical place for the current application of implant therapy, as we strive for new procedures mixed with a wide variety of implant designs. This also creates a complex situation where patients have proprietary and often unique implant designs, which are marketed for a transient period of time. Eventually, the technology matures (essentially a technologically steady state) with the development of a common platform (a standardized, commonly used set of design parameters), allowing the market to then develop alternative business models and applications that allow a lower-cost replication of a standardized technology.

Currently, there is a lack of uniform standards in implant design that demands complex, costly chair time and often discourages patients and prosthodontists when parts, pieces, and widgets cannot be found. This is again a symptom of the issue that we live in a time of solution-based technologies that are ripe for being rapidly converted with a disruptive change. We are health care providers, not technologic geeks. Our value to society lies in our diagnostic and treatment-planning skill sets that allow us the vision to assess the value and clinical impact of these technologies (some being embraced, some discarded). And all with an eye towards the efficient and efficacious care of our patients. We must look beyond the walls of our operatories because we must not risk acting like the captain of the Titanic, more concerned about the technologic design of the desk furniture than the direction in which the ship is sailing.

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