The Non-Traditional Disruption of Healthcare You Aren't Thinking About

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I will start out by telling you I don't believe healthcare is an enterprise that is, in fact, actually "disruptible." To disrupt is to temporarily destroy, throw into disorder, or break apart something, and in common usage, it also usually implies an event or events that are somewhat sudden. So while I will use the term from this point forward, I will really be implying "evolving on a rapid timeline." Why? Because healthcare is not a flip-phone, in-person video rental establishment, or a desktop word processor about to be destroyed by a handheld computer or an online streaming service. Modern healthcare is the most complex institution in the history of mankind.

> Disruption of the delivery and business models of healthcare is inevitable due to the increasing empowerment of the individual—empowerment in turn made possible by the accelerating democratization of information and technology.

Understanding Human Biology's Role in Healthcare Disruption

In 2014, more than 25,000 English language biomedical science journals published more than two million manuscripts, and that number has increased by about 3 percent annually since then.[1] Obviously, it is not just the number of articles published, but the accretive revelations they provide that have rendered human biology increasingly less mysterious, but ironically, increasingly less comprehensible as well. As a result, we actually passed an important landmark a few years ago, whereby the human brain was no longer capable of comprehending its basic building block—the human cell. Unexpected insights about how the human body works *normally* (new biochemical pathways and regulators, interactions between these pathways, new understanding of how the various organelles function, gene function, and regulation, etc.) just keep coming. I am not even going to mention a parallel line of investigation into disease causation and pathogens, but just multiply everything in this paragraph prior to this sentence by about five times.

What about drug development and manufacturing? As our understanding of biology and disease causation becomes more robust, the targets for traditional and biologic pharmaceuticals increases in tandem.[2] Because of this, one of the more pressing issues we must deal with in the near future is not our ability to create new drugs, but how we will test all of those that are in the pipeline to know if they are safe and effective. Add to this list the financial Rube Goldberg machine we have created via healthcare compensation, reimbursement and payment schemas, and varying practice models. To be complete, we should add in the activities of the only groups that are perhaps even more creative (and I will let you decide what is implied by that) than the biomedical scientists churning out those two million manuscripts—our colleagues in medico-legal fields and healthcare legislation and regulatory activities.

Who knew healthcare could be so complicated? As a matter of fact, it isn't—it's complex, and in the final calculus it is complex not only due to all of the foregoing considerations, but also because healthcare is at its core a social endeavor. This means that human behaviors, biases, likes and dislikes, prejudices, and previous experiences are all unavoidably factored in, therefore, change in human behavior is the ultimate non-traditional disrupter.

At a recent meeting, I listened to Rashid Tobaccowala, the Chief Growth Officer of the Publicis Groupe, a large multinational and public relations firm headquartered in Paris, speak on the topic of business innovation. He mentioned something during his session that has stuck with me firmly ever since: the concepts every industry needs to be acutely aware of in the near future, to avoid "disruption," are the blurring lines of competition and the empowerment of the individual. The former is the topic for this article, and the latter is what will—with accelerating speed and increasing imperative—power the former.

Key Board Takeaways

The most significant non-traditional disrupters of healthcare are going to be those that put more responsibility into the hands of individuals. Below are some suggestions for what hospital and health system boards should do in response:

- Embrace the democratization of technology and information.
- Work on strategies to collect the data that is being generated in these patient-generated healthcare interactions so that it can be incorporated into your EHR.
- Begin to develop strategies whereby these practices can have a positive impact on the bottom line by decreasing the fixed and variable costs of delivering care.
- Consider new healthcare insurance models either as a provider sponsor of risk, or in partnership with payers, whereby patients are given more tools and responsibility, in exchange for lower premiums or other benefits.
- Be aware of retail medicine moving into more complex and chronic disease management. Many of them are already co-developing and selling technologies used by individuals to diagnose and treat disease.

Convenient Healthcare and Telemedicine Are the New Normal

Convenient care clinics more or less exploded onto the scene several years ago, pioneered by the large retail pharmacy chains in the United States, and followed quickly by big-box retailers. I use the term "exploded" because they grew for the first several years by almost 100 percent year over year in regard to numbers of visits. Although at a slower pace, they continue to grow with an expectation that almost 3,000 will be in operation by the end of fiscal year 2017, with the capacity to accommodate 25 million visits.[3] We have learned several things about these clinics over the past few years, including the following:

- They do not improve access for the medically underserved—primarily being located in and utilized by more affluent communities.
- They have not lowered the cost of care by "substituting" for more expensive hospital

1 Michail Kovanis, et al., "The Global Burden of Journal Peer Review in the Biomedical Literature: Strong Imbalance in the Collective Enterprise," November 10, 2016.
2 Rita Santos, et al., "A Comprehensive Map of Molecular Drug Targets," *Nature Reviews Drug Discovery,* December 2016.
3 Accenture, "Number of U.S. Retail Health Clinics Will Surpass 2,800 by 2017, Accenture Forecasts," (press release), November 2015.

or health system visits, but rather have raised overall costs by allowing pent-up demand to be more readily accommodated (representing about 2 percent of all primary care visits nationally, but therefore not "eating into" traditional setting primary care practice volumes).
- Younger adults, female patients, and those with no identified primary care provider were more likely to utilize them.
- They have not been shown to decrease urgent care or emergency room visits.

I no longer consider retail convenient care clinics focused primarily on low-acuity transient problems to be "non-traditional disrupters" of healthcare, but do believe we have learned, or perhaps more accurately, are reminded of two important things from our ongoing experience with retail care, which will support later commentary regarding truly non-traditional players and approaches. Those include the fact that the traditional model of primary care, for various reasons, has not met the access needs of many populations, and for some with less complex conditions, convenience completely trumps doctor, hospital/health system, or payer–patient relationships. As most of you know, these enterprises are increasingly edging into chronic and more complex conditions. While this could have an impact on healthcare provider organization revenue, I don't believe it will be large and again, would not consider this to be entirely disruptive—with one caveat I will later suggest.

Some would consider traditional (phone and/or video) telemedicine a "next step" beyond retail convenient care—and also a disruptor—but again, I do not necessarily agree, and feel the value of this experience has been similar to retail clinics. Most hospitals and physician groups are now participating in a formal way with various aspects of more sophisticated telemedicine care delivery. It is interesting to note (especially with the controversies that have swirled over the past few years regarding regulations and restrictive rules in some states in the U.S.) that "telemedicine" has been practiced for decades. Twenty years ago, if you called your pediatrician's office with a question about your child's condition, or the surgeon's clinic after surgery with a question, you likely received care by phone (i.e., telemedicine). It is important to note that many employers offer telemedicine

services to their employees as a healthcare benefit and encourage them to use the services due to a potential lower cost per visit to the employer. In a recent National Business Group on Health survey, 96 percent of employers interviewed planned to offer telemedicine programs to employees by the end of fiscal year 2018, and all by the end of fiscal year 2020.[4] Depending on the vendor utilized, the clinicians may or may not be employed by a health system or physician group, so while this is not necessarily "disrupting" healthcare, it is posing a growing competitive and financial threat to traditional provider organizations. Teledoc, one example of a telemedicine company that employs its own providers and contracts with many large employers, saw a 59 percent increase in revenue in 2016, and a 43 percent growth in membership to more than 17 million individuals.[5]

There is always a chance that some incredible scientific discovery will take place in the near future, creating significant disruption in the delivery of care. The first new class of antibiotics to be discovered in 30 years was recently characterized—isolated from naturally occurring organisms literally found in dirt in a field in Maine. The inaugural member of the group, Teixobactin, has been shown in laboratory tests to kill many problematic pathogens, so far with the development of no resistance to the drug by the bacteria being treated. These types of advances are promising, no doubt—but again, perhaps not disruptive. Biomedical advances have been occurring in an ongoing fashion for centuries, and should more appropriately be considered incremental innovation or improvement of care, rather than disruption. And don't hold your breath regarding the ability of any drug to outsmart the humble creatures that both live with and wage war against humans daily—life finds a way.

The Most Important Non-Traditional Disruption of Healthcare Is Coming from the Empowerment of the Masses

So it seems as if everyone—especially 25-year-old computer geniuses in Silicon Valley who may or may not know the difference between a barcode and a code blue—are telling us that "disruption" of healthcare is imminent. Is this just hype, or is "evolution on a rapid timeline" for medicine actually imminent? The answer is an unequivocal yes to the latter…as a matter of fact, it is inevitable. Disruption of healthcare is not coming from the logical progression of the doctor or other provider–patient delivery and business model that follows—just transposed physically via a retail pharmacy emptying out a storage room and converting it into a clinic, or on a small phosphorescent screen. The biggest "non-traditional" disruption to the delivery and business model of healthcare in the foreseeable future is the complete elimination of this relationship for some care delivery. Disruption of the delivery and business models of healthcare is inevitable due to the increasing empowerment of the individual—empowerment in turn made possible by the accelerating democratization of information and technology.

The disruption is coming from an amalgam of these two things—the Internet and its ability to deliver information and instruction of virtually unlimited detail to anyone, and increasingly everywhere, as well as technologies that allow individuals to monitor, diagnose, and even treat their own illnesses. Five years ago, I asked a friend of mine who is a healthcare investor his opinion on the concept of "self-care." He laughed and said, "People have been talking about that for years, but I just don't see it happening any time soon…how many 'smart scales' has *your* health system distributed to elderly patients with heart failure?" When I think about his comment now, I recall similar thoughts I had when seeing people carrying briefcases around containing their late 1980s cell phones—transported that way because they were larger and heavier than bricks. We have not been very good at self-care until recently,

4 RAND Corporation, "The Evolving Role of Retail Clinics," 2016.
5 Teladoc, "Teladoc Announces Full-Year and Fourth Quarter 2016 Results" (press release), 2016.

because our access to useful information was poor, and the technologies we had at our disposal weren't very good. However, just like the size and utility of the cell phone, this is changing.

The Democratization of Information and Technology Will Dramatically Change Healthcare Delivery

When I was in medical school, the only way for someone else to get the information I received was to also be admitted as a student, sneak into the biomedical library, or perhaps purchase medical textbooks at the bookstore (which occasionally you could not purchase unless you could prove you were in a formal medical education program). Alternatively, you were relegated to buying "over the counter" home medical advisors—these being the primary medical reference source for the general population for about four centuries, culminating in Dr. Benjamin Spock's *The Common Sense Book of Baby and Child Care,* published in 1955. While the best-selling book of the 20th century is The Bible, Spock's book is actually second on that list, with more than 50 million sold. However, the digital revolution has changed everything—democratizing information of all types. At least four billion individuals are on the Internet. More than one and a half billion of them have sought online health-related information and a billion more have sought information about a specific medical condition. WedMD.com, created in 1996, provides health, wellness, and disease information for general consumption—including links to a large array of images and videos, as well as a "Symptom Checker" capable of suggesting an array of diagnoses based on what an individual types into the platform. It is currently the most visited healthcare-related site on the Internet, and receives more than 30 million visits per month. The second leading site isn't far behind—Drugs.com receives more than 25 million visits monthly, and provides information on more than 24,000 drugs. Where individuals may find health or disease information online are now virtually innumerable and of incredible breadth—recreating a health information "long tail" encompassing not only common conditions, but also the esoteric and rare. The information on these sites is no different from what I learned in medical school; however, the online pictures are unequivocally better than the blurry overhead 35 millimeter slides I used to squint to see from the back of the classroom.

Moore's law, the rule that the number of transistors per square inch on a computer chip doubles every 18 months, has been increasingly applied as well to the democratized technologies (along with advances in materials science and power sources) that will increasingly allow individuals to monitor and diagnose their own disease—and treat it as well. There are diabetes glucometers that send each of your measurements to the cloud where they are analyzed, and a determination is made whether or not to send you encouragement, advice, or an ambulance. The smartphone itself is capable of measuring and tabulating many things related to activity and health, and as of 2016, there are more than 250,000 mobile health applications extant developed by more than 50,000 publishers, and development is driven by a market worth more than 30 billion dollars by 2020. While almost anything can be attached to the device, one company recently acquired by Google, Senosis, has apps that use the existing tools available in the phone, such as the accelerometer, camera flash, and microphone to measure bone strength, the level of hemoglobin in the blood (a red blood cell count), bilirubin (a pigment that collects in the skin when liver function is abnormal), and lung function.[6] Smartphones extant themselves? More than two billion. The world's most successful activity tracking device, Fitbit, has sold more than 70 million units over the past five years, and a host of other devices are now being used by individuals with no provider of healthcare in sight—examples include devices to monitor sleep quality, to treat and monitor sleep apnea, measure virtually every human physiologic parameter, and more. In the near future, we will be using handheld devices to do our own imaging. Sound far-fetched to you? Philips has a handheld ultrasound device called Lumify, which can be connected to an iPhone. While the average person can put the device on their upper abdomen in hopes of looking at their gallbladder, most would be incapable of reading the images. However, the software to allow anyone to make their own diagnosis of cholelithiasis (gallstones) is being written now.

Putting the Disruption in Perspective

Health system and hospital board members should be engaged, and familiar, with the concept of individual empowerment. Many of them come from industries (banking, personal finance, retail, etc.) where individuals were empowered several years ago by technology and have already experienced benefits such as lowered fixed and variable costs of doing business, and increased access to products and services. The empowerment of individuals in healthcare, while it lags behind other sectors, will eventually be even more impressive—and impactful—as individuals are not only accessing information and services online, but also using other technologies in their homes to prevent, diagnose, and treat disease. A number of technologies are already available—some examples include those designed to make aging in place safer (motion and location detection devices, fall prediction, and prevention analytics), improve medication adherence and compliance (digital medication dispensers with video capabilities), improve diabetes management (digital glucometers with reminders and alerts for both patients and their providers), and online

6 Abhimanyu Ghoshal, "Google Bought a Startup to Monitor People's Health without the Need for Complex Hardware," *Business Insider,* August 14, 2017.

virtual asynchronous care. Board members should ask if their organization is working with these or similar technologies, and if not, urge them to do so in order to begin to learn how to leverage them, and provide encouragement based on their experiences in other industries.

It's not just handheld devices that are democratizing access to medical technology for individuals, but also a host of both online tools and diagnostic resources. Companies like Zipnosis have created virtual care capabilities, whereby a patient can answer a series of questions, and a computer algorithm, rather than a physician, renders a diagnosis and treatment plan or "triages" the individual to the appropriate level of care (i.e., suggests that a patient need not see the doctor, should schedule an appointment, or go to the emergency room, based on the algorithm's findings). A doctor later "asynchronously" reviews the findings and suggested treatment, and has the right to rescind the recommendations—but infrequently does. In addition to virtual care, a host of diagnostic modalities are now available as well—blood chemistries, complete blood counts, HIV, hepatitis screening, and even stool microbiome evaluation can all be ordered without the need of a physician. Medicare spends more than seven billion dollars annually for laboratory testing,[7] and this has obviously been a significant revenue source for health systems over the past few decades.[8]

What this means is that the most significant non-traditional disrupters of healthcare delivery in the next decade are going to be those that put more responsibility into the hands of individuals, and those individuals themselves. In aggregate, companies that offer democratized diagnostic and treatment tools and services to individuals will make an increasingly large, and perhaps unanticipated impact on the economics and structures of care delivery. What should hospital and health system boards do in response?

Here are some suggestions:

- Embrace the democratization of technology and information—this is not a reversible trend. Consider partnerships with companies that are supplying these resources to individuals, and even developing your own capabilities in these areas where it makes sense.
- Work on strategies to collect the data that is being generated in these patient-generated and empowered healthcare interactions so that it can be incorporated into your EHR. Your clinicians will have information gaps otherwise, and your ability to understand your patients—both their medical and general service needs—will be compromised if you are unable to do so in the future. Developing partnerships with the enterprises patients are interfacing with directly is a good first step, as many are willing to work with health systems to achieve these goals.
- Begin to discuss and develop strategies whereby these practices can have a positive impact on the bottom line by decreasing the fixed and variable costs of delivering care.
- Consider new healthcare insurance models either as a provider sponsor of risk, or in partnership with payers, whereby patients are given more tools and responsibility, and in exchange, are given the option to have lower premiums for coverage or other benefits.
- While I mentioned earlier that I do not believe retail medicine to be all that disruptive, I would suggest that traditional healthcare providers watch closely as these enterprises move into more complex and chronic disease management. Many of them are already co-developing and selling technologies used by individuals to diagnose and treat disease. If they decide to move heavily in this direction—developing partnerships with the suppliers of these technologies (whom they already work with as channel partners), and bundle them with other services, it could indeed be disruptive.

As I have suggested, this is not a reversible trend, and we should neither be surprised nor discouraged by these developments. Human beings have progressively leveraged the use of machines to be individually more competent at completing tasks, and we will continue to do so. We seem thus far to have an unending ability to develop, grasp the benefits of, and use technology to our individual benefit. We have progressively moved from having no tools (like cars, books, and kitchen appliances) to being dependent on "experts" to use these technologies, to using them ourselves independently and with surprising capability. Healthcare technologies are no different. Diabetics interested in knowing their blood glucose levels, and women wondering if they might be pregnant have been performing diagnostic tests for decades now—the former several times a day, and also treating themselves using the data that they obtain.

We are not talking about draining the ocean here, but if previous human experience is instructive—and it usually is—the waterline is going to move. Complex diagnostic and interventional care will likely always be the purview of the experienced clinician, but low level acuity interventions are fair game for every person at this moment, and more complex ones in the future based on the use of available information and increasingly sophisticated technology. This transition will not happen overnight and there will be no sudden loss of patients or revenue, but healthcare boards and providers would do well to begin to think now about how the lines of competition are becoming blurred, and the non-traditional disruption that is coming as a result of individual empowerment.

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7 Suzanne Murrin, "Medicare Payments for Clinical Diagnostic Laboratory Tests in 2015: Year 2 of Baseline Data," Department of Health and Human Services, September 2016.
8 Kelly Gooch, "Uncovering Revenue Sources through Transformation of the Hospital Lab," *Becker's Hospital Review,* May 11, 2016.