



EPISODE 2: ADJUSTING TO DISRUPTION: THE “NEW NORMAL” IN HEALTHCARE

INSIGHTS FROM THE BDO CENTER FOR HEALTHCARE EXCELLENCE & INNOVATION

Patrick: We're going to talk about adjusting to disruption, the new normal in healthcare. Welcome to our next topic on disruption in healthcare.

I'm Patrick Pilch, again, the national healthcare leader for BDO and the BDO Center for Healthcare Excellence with Steven Shill and David Friend.

On the previous panel, we talked a lot about how disruption is creating some opportunity for investors. There's also some risks and challenges with anything, right? But now we want to shift gears to focus on what's impacting patient communities and the healthcare industry at large.

We have an incredible group of innovators to discuss their experience and outlook, I am overwhelmed by their intelligence, and I'm looking forward to a great conversation.

So firstly, to my left, Lisa Alderson, who is the co-founder and CEO of Genome Medical, a digital health company bringing genetics to everyday life. Lisa has 20 years of experience building early-stage companies with a focus on technology, consumer, and life sciences businesses. She's held C-suite positions with Invitae—I'm doing my Latin right here now—and CrossLoop Inc. She was part of the start-up team at Genomic Health, Inc. and a former manager of strategic planning at the Walt Disney Company. Lisa is also a board member and adviser with a track of creating funding and managing high-growth ventures, so everyone has to welcome Lisa.

Next, we have Lee Jones. Lee is the CEO of Rebiotix Inc., and she's also the co-founder of the company. She's an experienced medical technology executive and a serial entrepreneur with deep experience in the medical devices industry and in managing and advising academic scientists. There's some in the room here. On commercialization efforts, so there'll be good cross-pollination, certainly, Lee. Rebiotix marks her first foray into biotechnology. She is leading a fast-paced effort to develop a new way of treating disease through microbiota restoration therapy. So welcome, Lee.

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Lee: Thanks.

Patrick: Martin Kelly, founder and CEO of HealthXL, the leading platform for health technology collaboration. Prior to HealthXL, Martin was a partner at IBM's Venture Capital group and led the development of their global entrepreneur program, including the worldwide rollout to over 20 countries. Martin has worked in the tech industry since the early 1990s in a variety of technical, project management, and business development roles.

And finally, we're delighted to have Dr. William Payne. Dr. Payne is the co-founder and CEO of myowndocor.com. It's a telemedicine platform that helps providers virtualize care and educate their patients and caregivers. Dr. Payne is an orthopedic surgeon, healthcare executive, and entrepreneur. He is very active in his community and is an involved board member for several nonprofits and foundations.

Thank you all for joining us today. You have such great, compelling and very diverse backgrounds, so I'm very excited about this conversation. So let's get started.

So we have a number of questions, and what we want to do is sort of allow you to have space to talk about your vision, almost like your pitch, if you will, in terms of what you're doing and how you got there.

DRIVING VALUE FOR A NEW KIND OF HEALTHCARE CONSUMER [3:52]

So all of you have something in common. Your companies have been founded at least in part to drive value for a new kind of healthcare consumer. So how do you understand today's consumer's needs—and again, it's changeable, obviously—and desires to create options that in turn create value for them? So Lisa.

Lisa: Sure. So first, by brief background, Genome Medical is a digital health company focused genomics. So genetic testing and genomics, more broadly, is technology that's just growing exponentially. But what hasn't grown are the number of experts in the field as specialists. So there are just 2,000 geneticists in the United States and about 4,000 genetic counselors.

So as we march towards this new era of precision medicine with genomics as sort of an underlying component of that, we see this as a real last-mile access we need to bridge between the medicine, the science, and the technology that is now abundantly available and the practice of medicine. And so how do we translate these great tools and technology into everyday healthcare?

And with that, I see a real trend around consumer empowerment and interest in enablement witnessed by the rapid growth in consumer genetics and consumer genomics, but also by the incredible acceleration and clinical utility around genetic testing, and more broadly than that, genomic technologies.

And so Genome Medical is looking at, how do we innovate on service delivery? How do we help solve what we call is a last-mile

access program, our problem, where we really help enable both an individual as well as a medical practitioner to bring genetics into care delivery?

And I think there are a couple of trends that are coming together. One, an improvement to drive towards accelerated and improved patient outcomes. And second, a drive to lower the cost of health care delivery.

And genomics actually offers the promise of both together, and often, you don't see those. Those can often be in opposition to each other. And so I think we're seeing the industry move much more towards value-based care and how do we really measure based on improvement and outcomes.

And I'm excited to be a participant in that and would really love to have Genome Medical be a catalyst that helps shepherd in that era of genomic medicine but in a really medically-responsible way and yet a more efficient and scalable way than has been done before.

Patrick: That's great. Thank you. **Lee?**

Lee: So I'm Lee Jones, and I'm the president, founder, and CEO of Rebiotix. Just a brief background on Rebiotix and how I got involved with this is, Rebiotix, we're developing new drug therapies that are based on live organisms, and those organisms are actually the active drug product.

So we take microbes from healthy humans, and we package them, and process them, and then deliver them to sick people with the idea that we can repopulate their gut microbiome and help that patient reverse the colonization.

So they can become their own best chance against fighting infections. I got involved in this because, as I started looking transitioning from being a med device executive into the biology sphere, I really believed that biology was kind of the next wave of medicine.

And I looked at the microbiome and got very excited about it because my imagination ran wild, and I started thinking about all the things that we could do if we could have the person's own body help them be disease-resistant.

And given the background that antibiotics are becoming less useful with disease resistance, I started thinking of all the ways that we could possibly change the way medicine is practiced.

So we started out to bring a drug to market. We are currently the farthest along in any microbiome company today anywhere and are pretty excited to be close to commercial launch of our first product.

So for me, I agree with Lisa. Looking ahead, when I started Rebiotix, I started thinking about where the insurance industry, healthcare, and everything was going to be merging sometime in the future.

In my medical device days, you added features, and you charged more money, and you didn't really have to provide a lot of medical evidence that things were going to work.

That, to me, has completely changed. And actually, I appreciate the fact that now, as you're doing clinical work, you have to provide a benefit, and you get value based on that benefit.

As I was looking at that intersection between insurance and the patient, it became pretty obvious that the healthcare system is driving what used to be a physician's work down into the nursing area and the nurses down into the lower level in the telehealth area.

So we had to look, as a product manufacturer, how we were going to fit in with that over time. I was a little bit, maybe, over-optimistic in how fast that would move. So when I designed my product, I designed it for the simplest possible use with the lowest possible skill-set and saving money in the system.

So I think we might be a little ahead of the game, but I think it's really important to recognize those trends. And as a company, try to project forward so that, when our product is available, we're hitting where that marketplace is versus being way out of sync.

Patrick: What is the delivery vehicle for your product, though? Is it a pill? Is it an injection?

Lee: So we have two different ways. We have a liquid suspension that we deliver via enema, which is our first product. And we picked that, specifically, because we have multiple doctor customers. Some do procedures, some don't. This gave them an opportunity to treat their patients without having any special equipment.

So we also looked at the reimbursement so that the physician, from my medical device days, the physician can make some money on the work that they're doing, and it works for their patient. That's the best of all situations. So the second product we're coming out with is an oral formulation.

Patrick: That's very helpful. That's great. Martin?

Martin: Good morning, I'm Martin Kelly. I'm the founder and CEO of HealthXL. We're a spin-out from IBM, and we started the company because we're very good at talking about collaboration, but we're very poor at collaborating as an industry.

And I think JP Morgan's a great example, right? Most people are tired of running around. And it's a great week, but it's a crazy week. And then everyone goes back to their day jobs, and has their patients to see, and have their sales quotas to meet, and all that type of stuff.

And so as much as we want to collaborate, it's really difficult. There's a statistic that I find kind of scary and interesting at the same time, which is it takes 17 years on average from when we agree something's the right thing to do as a medical practice to actually getting it out there. That's when we've stopped arguing about the science or the commercials, when we just say it's the right thing to do. And that's simply too long.

So the idea behind HealthXL is looking at the new wave of innovation we have around digital technologies and figuring out,

how do we connect all of the people that we need to connect? So patients, providers, payers, industry, and investors.

So we built a technology platform that collects information on innovation and allows people to review that the same way as we would with a drug or a device and actually try to calm the wild west that we have at the moment.

There's \$5, 6, 7, 8 billion going in each year to these companies and very little coming out in terms of financial outcomes or real health improvements. So we work with 40 of some of the largest health systems and industry partners. And we connect them online, but we also connect them in person and really try to understand, what are the problems that they want to collaborate on. And then what's the evidence. And bring in a network of experts we have around the globe.

So I think what's exciting about this is the consumerization and the potential for patients to really drive change and have health care as something that they participate in, not something that's done unto them.

Patrick: Is your platform more of an incubator, too?

Martin: Yeah, that's interesting. We started life as an accelerator. We thought, "Well, we want to invest in these companies," and then we realized that, actually, there's a huge challenge. How do you actually make sure that all of the stakeholders are engaged much earlier? And also, how can we be independent? So if somebody comes to us and said, "What's the best company?" or, "What's the evidence in a particular area?" if we're an investor in one of those companies, then we're hamstrung. We can't be objective.

Patrick: It lets you be more agnostic in terms of it?

Martin: Exactly. Yeah. So we've divested of our investments, and now we just focus on the technology.

Patrick: Okay. William.

William: So yeah, I'm William Payne. My company is myowndocor.com. We really started because we saw a couple things happening in the marketplace. One was consumerism. Most people today use banking as the sort of gold standard, if you will, and you can do many things from your mobile devices. You can't really do that in health care in the same kind of way.

The second thing we saw was what I call the 50-minute and five-minute rule. 50 minutes of waiting and a five-minute office visit. Right? I'm sure all of you have experienced that at some point. So there are plenty of visits that could be handled in a way that allows a patient and a provider to connect that doesn't require you to be there.

In fact, the AMA said 70% of visits are informational only, so you really don't need to be in the office to see the patient all the time. So we really were looking to create a relationship between the doctor and patient that's different, and more dynamic, and allows you to be able to have multiple touchpoints.

We know that the most powerful relationship is between the doctor and patient, and we saw disruptors like Teladoc and others who were basically saying, “Click a button, talk to a stranger,” and we found that to be disruptive. And I personally, being a doctor, wanted to preserve that relationship.

The second thing is, we wanted to empower caregivers. Caregivers, there's about 4.5 million of them that are paid. The rest are unpaid, about 50 million. They do \$450 billion of service to healthcare systems and other organizations, so if we could empower them with education and knowledge, we could really produce something that's incredible. So I wanted to give them those tools and figure out how to help systems do that.

Patrick: That's great, so I have a question for you there. So are you partnering at all with the payers at all directly?

William: Oh, we'd love to partner with payers, so if you have couple in your pocket, we'll be happy to speak to them. But yes, that's one way we can add value.

Patrick: No, that would make sense to me because it is about site neutrality, cost of care, and where the care needs to be provided to get away from the 55 rule. That would be, certainly, helpful. But no, that's great.

PREDICTING GAME-CHANGING TECH DISRUPTIONS [15:17]

Patrick: So, Lisa, I want to talk to you and the whole panel about—put down your crystal ball—or, look through your crystal ball. What technological disruptions or ploys that you see are going to change the game in healthcare in the coming years? And there's all right answers, by the way. There are no wrong answers.

Lisa: So I have a couple predictions. First, I think 10, 20 years from now, we look back and say, “How did we possibly diagnose patients? How did we possibly prescribe drugs? And we never looked at their molecular makeup. We never knew their genome, and this has such a profound impact on our health. It has a profound impact—it has much more accurate diagnoses, and it has a profound impact on the efficacy of drugs.”

And of course, we don't know everything about our genome today, but we know a lot more than we did 10 years ago. And we know a lot more—or, we will know a lot more in the future.

And if you really think about health care today, I mean, for the most part, we wait for individuals to become sick, we observe their symptoms, and then we do our best to try to alleviate those symptoms. It's very reactive.

And just as I think about there was a day in medicine where we didn't know how to do a blood draw. We didn't know how to analyze that. Seems kind of arcane. It's a very core fundamental component to how we deliver healthcare today. We will say the same about genomics in the future, and we will all be sequenced.

I fundamentally believe, in our lifetime, virtually everybody will be sequenced. In fact, today, if you would like to be sequenced, Genome Medical has you. You can go to genomemedical.com and we will take care of you.

And it's anything from a very basic cancer panel all the way up to whole genome sequencing. We can provide all of that. We have medical geneticists and genetic counselors. You go online, schedule an appointment, see somebody the next day. Evening hours, weekend hours, it's all very simple and convenient.

So that's my first general prediction, long-term prediction, that this will fundamentally change how we think about healthcare delivery. And it will make it much more proactive, such that we'll better understand our risks for disease, and we will not have a single standard of care for everybody.

We'll suddenly have a standard of care for individuals at high risk of cancer. We'll have a standard of care for individuals at moderate risk. We'll have a standard of care for individuals at low risk. And that will allow us to better treat patients according to their need.

That will allow us to deliver healthcare in a more efficacious manner, but also a more cost-effective manner because today, we're often over treating and we're often under-treating and we don't know which is which. We don't know which patients we're overtreating and which ones we're undertreating. So that would be my first prediction.

My second prediction is that I think in a much shorter horizon—and I'm going to put five years out there—I think, at the time of diagnosis for cancer, every cancer patient will have both somatic and germline genetic testing that will allow us to have much more information to better guide in a more precision manner the course of care for that particular individual. And I think that will allow us to dramatically reshape the face of treatment for cancer.

Patrick: So essentially, we're like software to a certain extent, right?

Lisa: Much more customization, yes.

Patrick: Yeah. And so targeted to the individual. Not just individual patients, just the individual, and then to design the right care protocol from there.

Lisa: That's correct. Yeah.

Patrick: That's five years from now? Okay, we've got that marked down.

Lisa: Yeah. And 20. I did have a five and a 20.

Patrick: It might have been 20 versus the five and 55. Lee?

Lee: So this is a little bit difficult. I'm not looking at something quite as broad, but I'm thinking that we all talk about how much data plays in the role of looking at the future, big data, how we're accumulating statistics about people. In my industry, we kind of do the same thing.

So when I started, we're talking about organisms in the gut, and there's billions of them. How do you look at what they do? And it comes back to data.

So the tools that we've developed, not just in my industry but across the board, to start picking up nuances in the data and looking at how to make that be meaningful, I think, is going to transform the way we look at healthcare. And that's going to come back to paying.

It gets back to you, kind of that whole integration piece, and different people will be looking at different parts of that data, but I think there's going to be more and more of that. That's going to help guide us forward.

Patrick: Okay. Martin?

Martin: So I think it's interesting, this side versus this side.

Lee: We can switch. We can switch.

Patrick: It was intentional, by the way. I'm just putting it out there. Girls and boys, yeah.

Martin: The progress that we have made as an industry in terms of technology and science is phenomenal, absolutely phenomenal. And I think that will continue to grow.

But if you think, then, in terms of our ability to absorb and use this and the care delivery, I think there's a huge mismatch. I think there's a huge opportunity.

So, I mean, my focus is really on digital. I think it's like 1997 again, in that we're probably 20 years behind other industries, and it's really exciting to see telemedicine now starting to become the start of, hopefully, a mainstream adoption.

So I think the diffusion of stuff into the real world is really exciting. I think that the challenge that we have is all of these problems are too big to be solved by one organization. And I think the catalyst will be, how do we empower people to own their own health and to act as the orchestrator of all the different components that need to come together?

Patrick: So who organizes that, though?

Martin: I think it has to come back to the individual. I mean, if you think, people organize their own finances. They organize their own transportation. Why don't they own their own health? And why don't they organize their own health? And why is health is done unto people rather than something that they manage and control?

Now, you need expertise. You need expertise in terms of finance. You need expertise in terms of education. We are going to get on a plan tonight and need expertise to—who's going to fly that plane? You know what I mean?

But at the end of the day, you decide where you go when you make those decisions, and we don't have that yet as an industry. And that's what I hope.

Patrick: William?

William: Yeah. I think that the things that we're going to see is we spend about 88% of the dollars on delivery of care today and about 4% on changing behaviors.

And I think that what we're going to find in the future is that 88% of dollars only affects about 10 to 20% of the outcome, and that 4% drives about 30 to 40% of the outcome.

And we're going to see those numbers sort of equilibrate to something that's more at equilibrium, if you will. People's behaviors, obesity is the new smoking, right? And people talk about it, but nobody's really figured out how we're going to tackle it or how we're going to address it.

And I think over the next five years—I'll use your number—we're going to see obesity become a bigger issue. And people are really looking for, how do I create customized tailored programs for all the subsets of peoples?

One of the theories is every diet is different, and every diet should be applied to a person, perhaps on their genetics, perhaps on their gut profile, perhaps on something else. And so how do I deliver that content and knowledge to them in a way that's meaningful?

One of the things that we do with our platform, we have the ability to create a curriculum and push that curriculum to people based on either dates, or times, or whatever intervals you want. So health education for populations is going to become an increasingly important activity.

The second thing I would say is that you're going to see more convergence. And that convergence is going to come from players that you may expect or may not expect, whether it's Apple, or Amazon, or others. Anyone who has a group of people that are loyal to them.

Pedal Time Bike Riders, for example, could suddenly be in the healthcare business. So if you're a healthcare assistant, you need to be aware and pay attention because it's going to come from someplace that you don't expect.

Patrick: So you could actually be an organizer to a certain extent, right?

William: Could. Could.

Patrick: Because you're organizing education, bringing ideas together, creating directionality for patients' information.

William: Absolutely. So if you have patients and you could organize them—so let me just give you an example. So they came out with a new high blood pressure criteria, right? You've got thousands of doctors who now need to get retrained. You've got patients who need to know how to use the blood pressure cuffs, take their pressure four times a day.

Who's going to train all those people? You can't train them one-to-one. I don't have time to do that as a doctor. So you've got to do it at scale. And so as soon as people realize that they've got to do it at scale, then they've got to get a delivery mechanism. And that's where we can help.

VALUE-BASED PRICING [24:11]

Patrick: That's very helpful. So one of the things that we talk about a lot in our world is talk about value-based payment, value-based pricing, and I think that this conversation is going towards that.

So it's important to the newcomers to know how to adapt to change in payment models. Right? Across the payments. It could be commercial, government, doesn't make a difference. Right? And we know three out of four providers say their patients are interested in value-based pricing.

This idea of, what did I pay? What did I get for what I paid? You go to a restaurant, you know what you pay, you know what you get. Same thing in healthcare. There's an opacity to that. So how are you addressing the trend towards value-based pricing models and the implications for your organizations, Lisa?

Lisa: So we do that in a couple ways. I mean, one, patients can self-refer and so there, it's a question of a benefits investigation. And is this a reimbursable event? Is it covered by insurance or not?

And just because the industry is changing so quickly, and to the earlier point of 17 years, it really does take that long because you've got to establish clinical utility for testing. You then get to medical management guidelines in place, and then you get to reimbursement coverage.

And actually, the last hurdle is the physician training knowledge adoption, and that just takes a lot of time. And so I think one of the opportunities we see in particular with this theme around consumer empowerment and taking more control over one's proactive health, payers do not cover, today, proactive health, in general, as a broad category, for the most part.

There's a few situations—six-month dental appointments and the like—but for the most part, there's limited coverage around proactive health. And that's true in the case of genetics and genomics.

And so we see one of the cores as, how do we set and establish prices such that it has a value for the patient? And they see that value, even as a consumer, a healthy, well person who wants to use information to better guide their ongoing care.

So if you're in your 20s and you're thinking to have kids for the first time, well, then it's about, how do I ensure a healthy child? And I should have carrier testing before I actually conceive. And maybe there's NIPT testing in that process. And some of that's reimbursed, some of that's not.

Similarly, if you're now in your 40s or 50s and you want to live the healthiest, longest life one can, maybe you're willing to invest a couple hundred dollars or even \$1,000 in knowledge that could help you better understand what your future may look like and that are actionable medically such that one could take preventive measures to actually change what that course might look like for you.

In the case of cancer, it's a 100% treatable disease as long as you find it early. So if you know you're at high risk, you may now qualify, according to insurance coverage, for an annual MRI, leads to earlier detection. There are sort of tangible benefits.

So we think of it as, how do we anchor around the consumer and the value proposition for the consumer?

Second area we're really driving that is with employer organizations, so whether it be a self-funded employer for kind of self-insured, or whether it be more in employee benefits.

Particularly, in the Bay Area, there's a lot of competition around talent, and I think that's true nationwide. And so offering more of a proactive health program and/or just bringing the standard of care in genetics to your employer base, we're seeing increasing degree of interest.

And there, I would think about it as, again, value-based pricing and that it can actually lead to health economics and improved cost savings.

Patrick: So you're saying that the consumer takes control over his or her well—health, rather, just as they would for their financing, for that matter. So we really need to plan out what their health could be.

Lisa: Correct. And go one step further and say, "Even if my insurance doesn't cover it, I'm willing to pay."

Patrick: I'm willing to pay.

Lisa: And I'm willing to pay out of pocket because this is my life. And I want to be here, and healthy, and well. And if there's something that might help me to do that, particularly if it's a couple hundred bucks, I might sign up.

Patrick: Yep. That makes sense. Lee?

Lee: So for us, we're a product company, and our products will be commercialized before a lot of the major changes take place. What we've done to look at it kind of, again, where that intersection of value comes in, is to scout like most people do.

What's out there today? How do we compare? And how does our efficacy, and how do the patients do over the long term compared to what they're being given today? What is the cost of what they're being given today? How do we compare to that? And how do we save money on that patient over time? So I'll give you an example.

We've done clinical trials that show a first use of our product and, if there's a recurrence of the disease, a second use of our product to see if there's a secondary benefit. And then we can look at how many people are treated adequately the first time, how many get an additional benefit, and then look at a value-price basis to say, "If we priced it in a reasonable way that gives us the margins we need, it gives the physicians what they need, and saves cost in the healthcare system, we can possibly price it so that if you weren't satisfied, you didn't get cured the first time around, you would be eligible for a free second time around. And everybody kind of wins that way because it works out so that we're taking enormous

amounts of money out of the healthcare system every time we prevent that next disease.

So we believe that there is a model there that we can go to and we are exploring that. And some of that comes back to how the other side, the peers, might look at that and how forward-acting they might think. So right now, we haven't tested those boundaries.

We've talked to peers, but we don't know how likely they would be to sign up for something like that or even how you would deliver that to somebody. But I think that's what I'm hearing in the industry is where people are starting to think of value-based pricing being.

Patrick: I mean, I think that you would almost look at what's the current state, what the cost of the current state is, and you can demonstrate outcomes that are coming off of that. And you can drive a lot of better clinical outcomes, lower price, keeping people out of high-cost location sites. You could probably do a good job at demonstrating that.

Lee: Yeah, we're still at a model where they physically fix that versus in the long term, what we're looking at is creating a microbiome health index, for example.

Looking at kind of where—we've started the statistical process to start looking at, is there a way to distill the health of your microbiome down to one index, one number that says, "Yeah, this person is headed this way for disease," or, "No, they're healthy"?

So the idea is that, as we gather this data, we start going forward in time to have an index that says—like blood pressure, for example. People treat blood pressure today not because the blood pressure itself is causing a physical problem, it's because they're preventing the occurrence of heart disease, or strokes, or whatever in the future.

So that is a value-based thing today. We're looking at the same thing on the microbiome space. If we can get to that point where you'd look at somebody's microbiome like your genetics, right? Can we insert today something or recognize that that person is heading down the wrong path, fix their microbiome, and prevent that, whatever that is, in the future?

So that's how I see my industry playing out, but I think all of those things that future looking—the question to me really gets back to the money and where the money goes to drive that because without money attached—I'm cynical, but I don't believe things get done without money attached.

Patrick: That's what this conference is about if you think about it. Just saying. Martin?

Martin: So I moved from Ireland to Boston, and it—

Patrick: And there was no difference. No difference, am I right? Am I right? In the summer, it was chillier in Ireland, though.

Martin: That's right. That's right. I won't pretend to even understand. I've been coming back and forth to the US for years,

and then having to get my own health insurance and trying to figure all that out.

But I think on the positive side, a lot of our pharma customers are very excited about how can we use our mobile phones and real-world evidence to actually show what impact you can have in the real world, not in a trial, and we use that as evidence for their submissions.

And William mentioned earlier about obesity. I mean, one of the companies that I really like is Omada, who are maybe trying to—I think they've got a really nice model up. They have some technology. They have a support group. They have a program, and there's a reimbursement to try and stop pre-diabetes and diabetes and get paid based on that preventative outcome.

So, I mean, those types of models are really complicated because you've got to get the technology working that the person at home can use it. You've got to have the coaches around them, support network around them. But you can use technology to do that and then to drive actual outcomes on that and prevent this epidemic. I think that's pretty exciting.

Patrick: As long as it's measurable. That's the whole thing. I mean, there's a voracity in the—

Martin: And now they're getting to the stage where they're running the trials, and they have the data, and they have the clinical data and the economic data. And then it's the—I think the companies that can do that and apply the same rigor that pharma medical devices have done will stand to be very big winners in terms of becoming the kind of leaders of the pack.

Patrick: That's great. William? What do you think? And you're right in the middle of that space when you think about it. You're a model.

William: Yeah. I think that the area to create value today is really around right site utilization. So patients end up in the wrong site, and then it's really costly. So it's how do you get the patient to the right point of care at the right time?

And sometimes the right site is just a text message or a chat. Sometimes the right site is an office visit. Sometimes the right site's an urgent care, and sometimes it is the ER.

In Indiana and Illinois recently, Anthem just came out with a new program that basically says if you go to the ER, and you get seen, and it's not an emergency, they're only going to pay \$75 to the hospital.

Right? So they're basically saying, "Look, if you're in the wrong site, you at the hospital have a choice. You can either go after the patient," which they don't want to do, "or you're going to eat it." So it becomes about how do I get the—

Patrick: Which they don't want to do, either.

William: Right. They don't want to do either. Right, but how do I get the patient to the right site at the right time? And part of that way that you can do that is by leveraging technology.

And so if you can develop that relationship, have the patient communicate with you early, use their caregiver as a proxy for them, then sometimes you can create interventions that reduce the cost of care.

And so it's about really understanding, how do I take a population of people, get them to the right place? Sometimes, they can self-select. So down the street at Stanford, they did a project where they let the patient pick. You can do an email visit, you can do an in-person visit, and people just sort of stratified out based on what they saw as their acuity.

So I think there's a lot of different ways and models to create value once you're in a value-based model, and I think it's an exciting time.

MERGERS ARE DISRUPTING HEALTHCARE DELIVERY [35:40]

Patrick: So we had... The previous two panel discussions, we talked about innovative mergers with new entrance from an investor's standpoint, right?

Who's coming in that is different that had not been there before? I mean, the CVS and Aetna's kind of a disruptive to a certain extent. So from your perspective, how disruptive do you expect these types of mergers, such as the CVS/Aetna, be on the healthcare industry over the next three years that will—see now we'll make it three, not five or 20, but really because 20 is like a whole lifetime. It's crazy.

To really understand kind of where you fit in, right? And what you're trying to do, but also how really disruptive it's going to be. Sometimes it's enough of a disruption that it creates opportunity or just does not create opportunity. So what do you think, Lisa?

Lisa: So one thing that stands out for me when I look at this slide quickly is it's really about consumer-driven, right? I mean, you're talking about Amazon, Google, Apple, even CVS. The CVS/Aetna, that's all about putting patient care in the spokes as opposed to the hub.

That's about getting to the patient at a retail center, and I read some stat where the vast majority of the population is within 1.5 miles of, basically, a pharmacy versus access to your whole care network and particularly cases where you have to go see specialists.

And so I think that hits one of the trends we've been talking to, which is how do you help enable more of this consumer empowerment, patient empowerment, and how does that change the landscape because, really, who has relationships with the consumer in innovative, and interesting, and new ways?

So one of the areas of genomics we haven't talked a lot about is pharmacogenomics, which is the concept of, when you're being prescribed a drug, is there anything in your genome that's going to interact in such a way that it's maybe contraindicated,

or has no efficacy, or perhaps would be demonstrated to have higher efficacy?

A number of drugs, actually about 130 or so now, that are precision medicine drugs where there's actually a biomarker that would indicate and actually be required in order to be on the drug.

And so you can imagine in the world of maybe three years from now. Maybe that's a little aggressive, but you've got your genome. It's on your mobile, and you go to your CVS, and you look and say, "Oh, I have Long QT, and this drug's contraindicated, and now it's not going to be prescribed." Right? What's the timeline for that.

I mean, I think Amazon has expressed a pretty significant presence in starting to play and operate in this space and, obviously, the others on that side as well. So for me, I think the takeaway is just, again, they're going to be a new entrance. It's going to be innovation in healthcare is here and, frankly, necessary.

Given our aging population, given the trend lines of increased spend, it's just not sustainable, so we have to have mass innovation. In fact, we're going to have a shortage of primary care doctors, and OB/GYNs, and interns. And I mean, there's all these trend lines that just show massive innovation will be required to continue to deliver healthcare. So that was my takeaway.

Patrick: Thank you.

Lee: So I'm actually a little bit afraid of the consumer—again, as a company, the consumer interest. And in my industry, for example, the microbiome movement, when I first got started in 2011, we put together a whole website to try to—because we thought we'd have to teach people about this in order to even have somebody talk to us.

And by the time we got it put together, the whole industry had run by because there was so much hype, and it got into the consumer networks and the consumer—I'm sure all of you have read the microbiome this, the microbial that, and there was kind of no way to answer that. There was no data, no clinical evidence.

But what happened as a result of that is there was such an enormous push even on the FDA to adopt something way before there was any data. We were in the process of putting our IND in and starting to go to clinical data. And the FDA said, "Wait a minute. We don't want to stop treating people or have physicians stop treating people, so we're just not going to enforce this, except on you."

So we ended up having to run clinical studies. We have a competitor in the marketplace who decided they didn't care about the FDA, that they just decided to sell product across the country. The FDA hasn't done anything about that because they don't want to stand between the doctor and their patient.

And so what's happened as result is the other company has said, "We have enough stock that we can supply a doctor who's untrained in this. The patient doesn't even have to qualify for what the disease would be, and we can treat them within two hours of this."

So as a result, what's happened is there's a conflict between providing that evidence-based medicine through clinical trials. Patients don't want to be in the clinical trial. Hey, I can go to my local doc, and they can buy it off the Internet so I can have it done.

So what we're seeing now is the aftermath of that because the people that were treated inappropriately who weren't successful, who are sick, are now flooding into our clinical studies, but we can't treat them. They can't be part of our thing because they've had a prior treatment that knocks them out of our patient population.

So it's created an enormous conundrum in the whole patient-driven piece, and what we're obligated to do from a regulatory standpoint because if we don't get our product through the FDA, we can't get it reimbursed. It's not widely available to everybody.

So there's that push-pull. So actually, I don't know if that's a good thing. I think it's yet to play out, but I think it's had a negative impact in our industry to try to do actual data gathering in a controlled way.

Lisa: I was just going to interject on that really quickly. I think that's such an important point. There is this sort of tension and balance between how do you drive to advancement in new technology, new science. But it really does have to be evidence-based and high efficacy of care, and so that's a very real tension point.

Patrick: Well, part of innovation, too, you also have destruction. You have failed models until something emerges out of that. So no disagreements. I'm glad you brought that up, though. Martin?

Martin: Well, it's great for my business. It's a boogeyman that scares all of pharma and health systems, and we just did a report on virtual pharmacies, and it was the most picked-up analysis we've done, so.

And I say that in terms of it's good to shake up the system. What I think is very interesting about it are the Net Promoter Scores that those brands have. You look at how—Apple or Amazon are viewed versus how an insurer is viewed...

Their brand value is phenomenal. And I'm sure there's going to be casualties and problems along the way. I'm sure, but I think it's good from the point of view of people not resting on their laurels and people starting to think, "How do I actually think about serving a consumer or a patient?" And thinking about them, not just, "Here, here's what I want."

Patrick: But understand what they mean—how it flows through, as well, to Lee's point. Because I think there's a lot of information that's not correct going out.

Martin: Yeah, yeah, yeah. A lot of people just don't think understand it.

Patrick: They don't understand it. Right.

William: Yeah, I think big for big's sake is not necessarily the answer. It's really about what services that they spin out. And I'll give you an example.

So Amazon has a—I mean, Apple has an Apple ResearchKit that some investigators have used to try to get patients for clinical trials. So your average clinical trial, you're struggling to get patients enrolled. It's difficult.

This Apple ResearchKit, they got 14,000 people to sign up within about five hours. So the power of their platform is that they can influence the consumer to react and act in different ways than we can in other methods.

So it's really about, how do I sort of get myself as a part of their system so I can use that, too? And the Apple ResearchKit is an example of something that is commercially available. You can use it if you're a researcher. So that's one example.

Second is the Echo Dot, Amazon's product. Right? So they did a trial in—I think it was in Ireland, where they were using the Echo Dot to assist caregivers. And basically, they were using it for medication reminders and different sorts of activities.

So it's really about what services do you create around these technologies that really brings the added value. So I'm not necessarily afraid of them. I just think it's important to understand that big for big's sake isn't necessarily the answer, but it's about how do you sort of create the innovation within the context of that environment?

Patrick: That's very helpful.

We did a study in the New England Journal of Medicine, and providers told us that they see major tech players. Right? We had a conversation earlier today about this. Like Amazon, Apple, Google, having a huge impact on the industry. So again, there's no wrong answers. Everyone gets a medal.

So what's your take on big tech's influence in healthcare? And who do you think—are these the only movers or shakers in technology coming in? And who would be the greatest influencers you would see? And I know it's a multiple question process, but would you consider working with a major player? I mean, you already kind of are through a spin-off.

Martin: So we work with—well, we spun out of IBM. We work with Google DeepMind, kind of been around the Watson stuff for a while. I don't think it's either/or. I think what's interesting is both parties need each other.

So whether it's the health system or the—neither of them can solve it on their own, and I think the ones that can figure out how to partner—and I mean, the stuff that Novartis and Google were doing about the lenses. There's a couple of those.

I mean, some of those will fail for sure. I think even the knowledge that they develop and build in those partnerships is going to be fascinating.

Patrick: William, how about you?

William: So I think they're going to be disruptive, and I think it's good that they're going to be disruptive. I'll give you an example. I mean, food scarcity, for example, is an issue. Right? And just sort of segueing about the Pop-Tarts. So one hospital looked at food scarcity, and I think it was around 12% or 15% of their patients who were having readmissions were getting readmissions for food scarcity. Right? So guess what, if I was a hospital CEO, I would send food via Amazon, via Peapod, Whole Foods, to that person's house to keep them out of my ER running up costs.

So I think the thing that they do really well is they understand their customers better than we understand our customers in healthcare. They have a much better sense of who that person is, what motivates them, how to drive them to do certain behaviors, and I think if we can partner with them, we can create incredible change.

Patrick: Lee, how about you?

Lee: That's a really interesting question because I like your comments about reaching out to consumer and knowing that customer.

One of the things that we've done that's different than a lot of drug companies do is we didn't outsource our clinical studies. So we hired people in our company to actually work with the physicians to do the clinical trials.

And what I realize is that my life as a medical device person, I was standing in surgeries watching stuff happen. So I knew how my stuff influenced that particular patient.

In the drug world, you don't really do that. You give your pills to somebody else who gives them to somebody else, and you're lucky if you hear anything other than an aggregate set of information. So I don't know how I would partner.

I mean, I'm thinking about this. Again, I believe there's probably a way, but I think if we miss that—if everything is done where there's no personal connection and to really understand that—because the disease I'm treating is much more complicated than people think. People think it's really cut and dry, and it's not. And so we've been really successful in our clinical program because we actually have somebody interface with the site.

So we hear right then, is it working, not working? Is that person having a problem? Yes or no? And so that feeds back into what we do. So maybe there's a way to do something like that. I don't know exactly, but I don't have a good answer.

Lisa: So I would say we really bridge between technology and healthcare. I think of it as a couple of pillars on our business model, which is that we're using technology to drive innovation in service delivery, and we're a medical practice.

So we really operate in both of those industries, and that in and of itself can be a challenge because you have physicians, and bioinformaticians, and scientists working with engineers, and product designers, and whatnot.

And so we all speak different languages, and being able to get that whole group working together in a company is actually quite an interesting study because people approach problems in different ways.

What I would say, though, is—so Genome Medical is backed by Canaan Partners, GE Ventures, Illumina Ventures, Kaiser Permanente Ventures, and HealthInvest Equity Partners. And we are built on more of a business-to-business sort of strategy, of a collaborative strategy.

So we want to work with hospitals. We want to work with health systems. We want to bring genomics into the community setting because right now, it largely sits at leading academic research centers.

And so we work with physician groups. We work with the community hospitals. And yeah, we license and work with major tech players in order to have delivery innovation and healthcare delivery. And so I think we kind of bridge between those two worlds, so I see sort of the promise and the benefit if you can do that effectively.

And they are different worlds, and the way they approach it is different. So I think we've seen a number of examples where tech innovators jump into healthcare. And I actually came out of tech. It's a bit of a wake-up call. I mean, this is a legal and regulatory environment that is quite different than consumer tech. And so being knowledgeable and informed, it's not as trivial as one might think.

Patrick: Nothing like jumping with both feet into a bowl of fire. Let's take some questions from the audience. Go ahead.

PRIVACY ISSUES IN PERSONALIZED MEDICINE [50:50]

Audience member: I've been dying to ask this question, which is health consumerism and personalized medicine. Basically, you all alluded to that and were comparing diagnostics on how pharma is actually building these mechanisms to know if the drugs are right for the right people.

Is there anybody in the panel that feels that this is going to be a contradiction when you have health consumerism and then you have a company like Amazon that bases decisions on what that patient has been purchasing, or that person has been purchasing. In health, it's not the same.

That's why we need doctors. You go to the doctors, and they tell you, "This is what you need." It's not going to be based on the decision about what drug you took or whatever health services you received in the past. So there is a bit of a—those trends can work together, but they can also really work against each other. So I'd love to hear your thoughts from the panel on that.

Lisa: Well, I'll interject. I mean, I think there's also a sort of the HIPAA privacy, security components to that as well, right? Because I'm sure we've all had in the early days of Facebook where you get the match around something where you're like, "I'm not a

50-year-old male, and why would you be putting that product in front of me?" where it didn't quite work as one was designed. So anyway, I—

Patrick: They're messing with your head, I think, there.

Lisa: Yeah, you'd probably guess which product I'd be referencing there. But the point is that ends up becoming even more concerning if you're now in more personalized information. So I would say there are definitely landmines and real concerns, particularly as you're working with Echo, as an example. I think that's a very cool technology, and then you think about, "Okay. Well, wait. Then we've now got HIPAA privacy information, and how do we make sure there's real walls, firewalls there around that information?"

Martin: It's tricky. Right? I mean, but in some ways, the cat's already out of the bag. People can go onto Google and get this mass of information that you can't really understand, especially, I think, about genomics. Right? I mean, even people who really understand it. It's a very complicated thing because it's not just that, but it's the behavioral change and stuff.

So I think you're spot-on. How much are we going to outsource that thinking to another party? And there's been a couple of cases in the UK with Google and DeepMind about the privacy of data that's kind of been all over the FDA.

Patrick: Yeah. I mean, there's clearly have been concerns I've been reading about that people are very—think about in the 1970s when you had—you talk about the wiretapping in this country as a major—wiretapping and getting permission to get wiretapped.

But you can say, "Well, I can get my Alexa device for \$39, and they know exactly what I'm doing in my house." And so there's this privacy piece, not just a healthcare privacy piece, just in general, your life. And so maybe when you start telling Alexa to play certain types of music, then all of the sudden you start seeing ads of certain types of music that they want you to sell-or, to buy rather. So any other questions?

Lee: I think, kind of getting back to your question, it is a really interesting question because I could see from an industry standpoint partnering with somebody to see their purchases, right? Did they go to the pharmacy? Did they go to the doctor, or how many antibiotics is that household sold?

So if you're targeting, for example, an infectious disease, you could possibly scout for patients there that you would be looking at that, especially as antibiotic resistance grows and you're trying to cut that down.

I mean, I could see—again, but I think what I'm—I don't see a financial incentive, and this gets back to my basic belief that money drives behaviors. I don't know how that would tie in. I mean, maybe there's a reward program for the consumer if you put your data—and I don't know, and then that gets paid back to the industry. I'm not exactly sure, but it is an interesting question.

Lisa: Well, that layers into FDA and, I mean, it's complex. And I probably want to move on, but one brief example, so Good Start was a company that—and still does, I believe, but sells carrier testing through Amazon.

And in carrier screening, for the vast majority of individuals today, they get carrier testing when they're pregnant. And that's vastly now limiting in terms of your choices of what you might do, and so you really want to pull that forward.

And through traditional medicine, this just hasn't really been pulled forward, and in certain segments, it has. And so there, the concept would be the catalyst of, well, if you make it more readily available to individuals, do they have it? Do they have it earlier? It may be a positive.

It is, however, diagnostic, and so you now need—in the case of care, that's a little easier than many forms of diagnostic testing. But regardless, you need medical advice around that. So yeah.

Patrick: Yeah. We have one more question.

GETTING INSURERS ON BOARD [55:48]

Audience member: It seems like the elephant in the room is the health insurer in terms of getting them on board. I mean, a lot of what you're talking about are products and services that, if they're going to be paid for, would require the health insurers to take a more comprehensive view of cost of care. I mean, for years, preventive health hasn't been really paid for by the health insurers, and what you're talking about is sort of in that same vein. How do you see that changing?

Lisa: I can use a specific example. So in cancer genetics, I don't know, five years ago, 10 years ago, certainly, but probably largely five years ago, we tested for two genes: BRCA1 and BRCA2. Today, that's largely what's reimbursed by many insurance companies.

And yet, the evidence has suggested that that's less than a third of the cause of hereditary breast and ovarian cancer. So there's now NCCN guidelines around 11 genes, but there are actually 80 gene cancer panels available on the market.

And so there is sort of this progress and progression. We've talked a little bit about it, where it starts with that establishing—it's really got to be evidence-based. And so I think one of the opportunities for change agents and innovators is, how do you demonstrate, maybe under that patient pay model, some of the efficacy, the utility. And then that helps amass the data and the health economics to ultimately drive it forward in care.

And so I wouldn't be surprised if, in the future, we are getting to what's more of the population health screening because costs are coming down. And at some level, if you think about it in cancer, if you can avoid treating metastatic cancer, that's a huge cost savings. You can test a lot of people at \$100 bucks, or \$200 bucks, or \$250 to avoid a metastatic cancer patient.

And so at some point, the health economics just make sense. And it occurs, but it takes a long time because you need the health

outcomes, you need the data, and you need it at scale in order to demonstrate that. So I think it's about finding the utility and the use cases, and in some cases, patient willingness to pay to help advance and drive it into standard of care.

Lee: And I've been thinking—in a way, I was thinking about Fitbits. Recently, had a relative who went through an AFib issue. And so the question is, how do you measure that person's heartbeat and see if they can go—so they can monitor themselves?

So the person got a Fitbit, right? So they can look at it. So they didn't sell the diagnostic. They didn't get paid for the diagnostic. That person bought an item of technology. So I'm thinking that a lot of the diagnostic tests that we're expecting somebody to pay for we'll pay for ourselves, just with a unit of something else.

So I could imagine Amazon or Apple company selling diagnostics in a different way, "Hey, I'll get all these people to buy my technology item, which will be popular, right? And for that, I'm doing the diagnostic for free." So I can imagine a whole bunch of different models that some of that stuff will get paid for but in a different way and so people aren't thinking they're paying for it.

William: I think the insurers are motivated. A lot of them have bought telemedicine companies, for example. A lot of them are

doing trials for their value-based patients, Medicare Advantage and others, to try to lower the cost of care. I think the thing for them is it's a one-year cycle, right? So I'm with them for one year, and then I'm gone the next.

So maybe the change comes in the way we sell insurance or buy insurance as consumers. If we bought a five-year plan, or a 10-year plan, or some other variation thereof, there'd be more reason for them to invest in our long-term overall health.

The second thing is really the aggregation of data and how they use it. I mean, they have a lot of data, right? I mean, if they want to filter that data and use it, they can figure out a lot of stuff. The problem is, once they figure it out, is how do you implement it?

So some of them have bought health systems and have bought doctor's practices and medical groups, so now they can actually drive care because the problem before was they didn't have a good way to do that. And so they're working on it. So I think they are interested and motivated.

Patrick: Yeah. Well, thank you all very much, Lisa, Lee, Martin, William. A very candid conversation. I appreciate it greatly. I hope everyone found it as interesting as I have. It's been very fascinating for us.

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