The Future of Healthcare

Speakers:

Steven Corwin, CEO, NewYork-Presbyterian

Joseph Frassica, Head of Philips Research, the Americas and Chief Medical Officer,

Philips North America

Moderator:

Marta Bralic, Vice President, Business Development, Flatiron Health

(Transcription by RA Fisher Ink)

Kirkpatrick: I want to invite on stage Marta Bralic from one of New York's great tech companies, Flatiron Health, who will introduce and moderate the next session, which is about the future of healthcare with some fantastic panelists. So thank you Marta, take it away.

Bralic: Thank you David. Can you guys hear me okay? This is how we know that there aren't enough women who participate in panels. The mics are not meant for long hair or for dresses. So we'll get there. Thank you for joining me.

Hi everyone, welcome to the Future of Healthcare panel. So my name is Marta Bralic; I am the vice president for business development at Flatiron Health. So we are a tech company right here in New York and our mission is to improve lives by learning from the experience of every cancer patient. So we build software that cancer centers use to treat patients and we also aggregate data across all of the cancer centers that we work with, into a national research platform, to understand treatment and outcomes for cancer patients. We envision a future of healthcare where we can truly learn from every patient, to inform the care of the next.

I'm joined on the stage to my right by Dr. Steven Corwin, who is the president and CEO of NewYork-Presbyterian. It's one of the nation's largest and most comprehensive healthcare delivery networks. Dr. Corwin is an internist and a cardiologist and since he's been at NYP, since he joined in 1979, he's led a number of strategic initiatives, in areas including digital health, launching a new ambulatory care center, improving care quality, and physician engagement with the institution. Thank you for being here.

Corwin: Thanks for having me.

Bralic: I'm also joined on my left by Dr. Joseph Frassica. Dr. Frassica is the head of Philips Research for the Americas, and he's also the chief medical officer of Philips North America. He leads broad-based medical, science, and technology teams to not only develop innovations, but also make sure that those innovations work at the bedside. He also serves as senior consultant in pediatric critical care at Mass General and is a research affiliate at MIT.

I'm excited to be here with these health care leaders to talk about the future of healthcare, all in about 18 minutes and 20 seconds. Thank you both for being here.

Corwin: Thanks.

Frassica: Thanks.

Bralic: Dr. Corwin, I'm going to start with you. So can you paint a picture for us of what patient care will look like five, then years from now? In a world of telemedicine and other innovations that maybe we can't even foresee yet, what does a patient's experience and interaction with the health system become?

Corwin: Well we know that the population, the U.S. population, is getting older, and therefore sicker. So we're going to have more disease. We know that more care is going to be delivered in an ambulatory setting, more care is going to be delivered by minimally invasive techniques. Genomic medicine, I think, is—we're right on the cusp of having major advances in genomic medicine. And I think underpinning that is going to be a big revolution in medicine with the use of artificial intelligence, machine learning, and telehealth. So I think all of those things are going to happen. The challenge, of course, for the country is how do we get quality up, cost down, and access improved? And that's going to be a major challenge for the foreseeable future.

Bralic: Yeah, we were talking about this earlier in the green room. You mentioned, you know, it's all about value. How do we get quality up? How do we get cost down? How do you fund innovation when there's pressure for value?

Corwin: Well, I feel very strongly that every industry has been disrupted by artificial intelligence, machine learning, technology disruption, and healthcare going to be no exception to that. And so we've made the decision to go a full frontal assault, if you will, into artificial intelligence, machine learning, and telehealth. And I think it's really important to recognize that if the outcomes of that are not just increases in convenience, but not only that, improved access to all sorts of healthcare, reduced costs, and improved quality, then it will be an experiment that's not worth doing. I believe that we can do all three with that. And we have to be committed to that journey. That requires a lot of money, and it requires the conviction that medicine has to change, which I think hopefully most of the audience agrees it does have to change.

Bralic: And what makes those changes hard in healthcare? I think a lot of the theme of today has been the pace of technology innovation and, you know, I think often healthcare can lag

behind many other industries in applying commonplace technologies to patient care. What are the some of the considerations that you have to think about if you're talking about a clinical care innovation, that maybe you don't if you're talking about, you know, a cellphone app?

Corwin: Well first of all, I think it's really important to recognize, ultimately healthcare comes down to a human-to-human interaction. So if you're going to go into artificial intelligence, machine learning, etcetera, it's got to be able to re-humanize, as opposed to de-humanize, care. Because in the absence of that, you will not get caregivers to sign on to that. Most people go into healthcare because they have the basic qualities of human empathy. So if those of you remember Philip Dick's book, you know, *Do Androids Dream of Electric Sheep?* that issue of what defines a human? What defines a human vis-a-vis the Turing Test? Really, we're coming to that nexus point. And I think it's really critical that as we advance in the Fourth Industrial Revolution, we bring those values to the patients; we bring those values to our caregivers. I think healthcare is complex, but there's no reason that we couldn't have adopted more of these things over a period of time.

Bralic: Yeah, and Dr. Frassica I wanted to give you a chance to jump in here, because we were talking about how you can make these innovations actually work in the workflow of a clinic. So how do you approach that at Philips?

Frassica: Yeah, so it's, of course, from a technology company standpoint, you know, technology companies tend to think about technology as the end-all and be-all. And my philosophy and that at Philips is actually, technology has to fit into that sort of human-to-human interaction. It has to enhance the ability for a caregiver to provide care to the patient. Without that, it's just another app on an iPhone, or just another box on the wall. That's a core to the way we develop things. We develop iteratively with patients and with clinicians, to go from idea to actual innovation. Without that pull from the market, without that insight from the clinician and the patient, the technology is not very useful.

Bralic: Absolutely. And I also want to go into an example that you shared with me. So we spoke last week and Dr. Frassica was telling me about efforts that they're leading to stem the spread of hospital-acquired infections. So this is when, you know, a patient is being treated at a hospital for something, and actually during their stay acquires a potentially unrelated infection, during their stay. And after we talked, I was wondering how prevalent can this really be in the United States? And I went on the CDC website and was surprised to learn that at any given time, about one in 25 people that's staying at a hospital, acquires at least one infection during their time there. So tell me, how are you using technology and data to fight this?

Frassica: Yeah, I love to share this. Because one in 25 patients understates this problem. In the United States, 1.7 million patients every year are infected while they're being treated. And of those, 100,000 patients die from that infection. And if you roll that up, if you do the math on it, it turns out to be more deaths from hospital-acquired infections than prostate and breast

cancer combined. It's a big deal. And it's very expensive. It costs about 9.4 to 9.5 percent of our inpatient acute care dollars are spent on hospital-acquired infection.

It is also a big problem. Because when a patient comes to the hospital, they get exposed to environments, they get exposed to other people, they get exposed to caregivers, they get exposed to a lot of things, devices, etcetera. And if you want to figure out how a patient acquired an infection, within the healthcare environment, you have to be able to untangle all of that information. And for one patient, it is a big data problem.

Where did they come from? What ambulatory setting did the come from? Who was their caregiver? Whose tie brushed up against that patient during a dressing change, etcetera? And so, in order to untangle this, we took two pieces of technology that are extant today that weren't really available about five years ago. So we're taking advantage of whole genome sequencing, so sequencing bacteria, which has become less and less expensive over the last five years, to the point where it's now practical to sequence a bacteria. And clinical data, where over the last five to ten years, we've started to collect clinical data within our electronic medical records systems, and within our healthcare environment.

So now we have these two pieces of data, which at the nexus of these two is the answer to hospital-acquired infections, we believe. So think about this: the average hospital has about 500 of these very serious infections a year. And within that average hospital, they have usually about six or seven epidemiology people who manually go around and try to figure out what the connections are between these patients who have these similar infections. Now at 500 patients, someone with a spreadsheet, trying to figure out those connections, it turns out to be about 125,000 possible connections between those patients, if you do the math out. It's very impossible. It's almost impossible to figure it out.

Last year we took a hospital about that size, that had about 500 infections that they were investigating, and we let them do the investigation. And they came up with one outbreak within their hospital. And we took the same data and ran it through our systems that coordinate between clinical data, where the patient was, who took care of them and the genome sequencing that shows us what the family trees of the bacteria are. And combining that data in real data, we found 40 infections that were spread from patient-to-patient. Forty, not one.

So those 40 infections, though, were at the level of the second patient. So if one patient gave it to another, we identified that as a potential outbreak. In doing that, we would have allowed those six people to focus not on 500 possible transmissions, but just on 40. And now there's only 300 possible connections between those patients. That's the kind of work that we're doing to try to narrow the scope of what these poor people have to do every day to stem the spread of hospital-acquired infections.

Corwin: It's a great point, and I think, you know, as you know, we've had neural networks for, you know, 40 or 50 years. It's the great increase in computing power that's enabled us to have

these predictive analytics. And I think it's critically important to recognize that that combination of computing power allows predictive analytics on very complicated situations. And it can be operational situations within a hospital, or medical situations. It cost us $1 billion to sequence the first genome, and 10 years. We can now sequence a human genome in less than a day for less than $1,000.

And so these accelerated developments allow us now to do things that we couldn't have dreamed of doing before. I think what we have to be careful about is how do we apply these? To whom do we apply these? How do we make sure that there are not biases built into these algorithms? So one of the classic examples recently is facial recognition software. So facial recognition software is excellent at recognizing white faces. It's not so good at identifying black and brown faces.

Why is that? Well, my suspicion is that they loaded two million white faces in and maybe 1,000 black faces in and now all of a sudden, they can recognize the white faces as opposed to the black faces. Well imagine if you have something that's dealing with a problem that's significant in hospitals, which is length of stay. What if you put in algorithms for length of stay that nudge people in the direction of, "This patient needs this test at this time." How do you know that that algorithm is not biased against people of color? Or people who don't speak English? These are things have to wrestle with. So as we apply artificial intelligence and machine learning, you have to make sure that the value system that you apply and the algorithms you're applying are really unbiased.

Bralic: I'm so glad you brought that up. It's something that we actually talk about at Flatiron a lot. As a tech company there can be this ethos, you know, "We need to move fast and we need to break things." But I truly believe and Flatiron truly believes that the standard is just different in healthcare. Because the stakes are much higher. You are analyzing data, you're preparing methods, that can influence the way care is being delivered or a critical research program. So I know one of the themes of today is around responsible innovation and responsible growth, and tech companies like Facebook are under pretty intense scrutiny around their use of data and their attitudes towards privacy. How do you think that consideration set in being responsible changes in a healthcare context, where the stakes are so high?

Corwin: Well, I think that the Europeans got it right in terms of the GDPR. I think that their protection of privacy is better than ours. And I think we ought to take advantage of some of the things that they've put in place. We have to look at any application that we put in place to make sure that the data's not being used in a way that we don't want it to be used. So for example, if we give an app to a person who has diabetes, we want to make sure that that person is now not subject to an ad targeting somebody with diabetes. That's kind of creepy. So as we have—you know, just as the same with Facebook, we need to make sure the data that's collected in these apps is only the necessary data for that app, and not extraneous data, that can lead to unwarranted invasions of privacy.

The second thing that we have to be concerned about, given the large numbers of records that we have and the sensitive information that we have, is cybersecurity. So five years ago, we had $2 million worth of cybersecurity insurance. We now have $125 million worth of cybersecurity insurance. We had three or four people working on cybersecurity. We now have 50 people working on cybersecurity. I meet with our cybersecurity team every other week, along with our chief counsel and chief operating officer, to look at the threats in the environment. Not only because we can have data exfiltrated, but we're now completely dependent upon these systems. So cybersecurity is the flipside of that coin, in terms of protecting privacy. And we've been working with Philips and others to make sure that software, the Internet of Things that comes into the hospital, is not a mode of attack, or is not a mode of exfiltrating data. So there's a huge amount on the privacy front that we have to really confront.

Frassica: Yeah, so your question is twofold. The first is about security and privacy, and we subscribe for sure to the rule of minimal necessary. So the rule of minimum necessary, in my mind, means we collect and use data that is the minimum data that we need to solve the problem or to answer the question. We don't store data that's beyond what we need. That being said, when we do need to store data, we use state-of-the-art security and cybersecurity tools, so make sure that our cloud infrastructure is secure. Now nothing's secure absolute. So there's no absolute to this, but we do our best to use high-level encryption and tools that separate patient identities from the actual data, to keep that secure.

The second part of the question was using these tools, how do you make them applicable to everybody? So how do you make sure that when you're using an AI tool, or a machine learning tool, you are developing something that is not exclusionary. And the only way to accomplish that is to adapt those machine learning tools to the clinical setting. So our approach to AI is called adaptive intelligence. We actually iterate not just on the machine learning level, but on the clinical level, bringing the clinical ideas and concepts that are in real life, into the AI environment. So that the end product is not just a function of an engineer's dream of the world, but an actual tool, that can be used in real life, to enhance that person-to-person encounter that happens every time you go and see your physician or your nurse practitioner.

Bralic: Yeah, exactly. And actually, one of the conversations we were having, Dr. Corwin, in the green room was around, you know, why can't telemedicine be delivered exclusively through cellphones and mobile phones? And you have a really interesting answer around disparities, actually. Can you share that?

Corwin: Well, I think part of what we have to do as a country is to make sure that we're reducing healthcare disparities and a lot of those healthcare disparities run along socio-economic lines. And whether it's the maternal mortality rate in African-American women or the death rate in prostate cancer for African-American men, there are disparities in our country. What we want to make sure of with telemedicine is to not increase those disparities. And there are a lot of people who do not have broadband access. And that's not only true in rural

America, it's true in the New York City Housing Authorities. So we put kiosks in Walgreens and also kiosks in our emergency rooms, so that people who did not have broadband access could get broadband access. And I think that that is a critical infrastructure investment that the country needs to make, both for rural America and for inner city America, if we're serious about reducing economic disparities. So my concern about broadband connectivity and its implications for health are that we don't want to just improve the health and well-being of people of means.

Bralic: Thank you. My closing question for each of you is what is the single thing that you're most excited about five years from now, the single healthcare innovation? And what is it going to take us to actually get there?

Frassica: Boy, this is a tough one, right? Because—

Bralic: I saved the softball for last.

Frassica: Yeah. Sitting in this, you know, home of innovation in Cambridge, there are so many innovations that are whizzing by us every day. We walk out on the sidewalk and someone's inventing the next Google. But I do think that, as I said before, the convergence of some things that we've been watching develop over the last 10 or 15 years, is happening now. So the development of really practical and inexpensive whole-genome sequencing, for human genome and for, as our team is doing, sequencing bacteria. Which turns out to be pretty inexpensive compared to a genome. A bacterial genome is about 1/100th the length of a human genome. That's a huge step forward that we now will have a tool to use.

And if we combine that with the automation that we've installed based on our moving forward with installing electronic health records across most healthcare systems in the U.S., there's a potential to find more synergies like I've already described in hospital-acquired infections, to improve care. That's utilizing these tools to make predictions about patient trajectories and trying to help intervene before patients become sick. I think those tools that we've described in AI can do that. But they won't do it, machine learning and artificial intelligence won't do a thing unless we apply the clinical insights of our customers, of our clinicians, and our patients, to that process. Without it, it's just machine learning.

Corwin: Look, I think artificial intelligence, machine learning, what's been called the Fourth Industrial Revolution, has the opportunity to really revolutionize medicine. It revolutionizes genomics and its interpretation, it's going to revolutionize material sciences and the applicability to medicine. It will certainly engender new device development. So I think that the promise over the next five years in all of those areas is dependent upon this dramatic increase in computational power and the ability to develop these neural networks, to really create a predictive analytics scenario, predictive experimental scenario, where you can make huge and rapid advances.

Bralic: I completely agree, and I think, to your point, it's going to take interdisciplinary teams of the clinicians, the engineers, the operations folks to make sure that it all comes together. So it's hard work. It's a compelling vision. We owe it to the patients that we serve to get there.