

The Economic Club of New York

Dr. Steven Corwin
President and Chief Executive Officer
New York-Presbyterian Hospital

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Interviewer: Melanie Evans
Wall Street Journal Reporter

Introduction

Moderator: I am delighted to introduce our guest speaker, Dr. Steven Corwin, who is President and Chief Executive Officer of New York-Presbyterian where he oversees one of the nation's largest, most comprehensive healthcare delivery networks that provides exceptional care to patients across six academic, six-campus academic medical center, a regional hospital network, and physician groups.

Since joining New York-Presbyterian in 1979, Dr. Corwin, a cardiologist and internist, has led numerous strategic initiatives, including the launch of the NYP OnDemand, a digital suite of health services, the development of the David H. Koch Center, a world-class ambulatory care center, the implementation of a Respect Credo, strengthening physician-institutional relationships and an increased focus on quality.

He obtained his undergraduate and medical degrees from Northwestern University graduating summa cum laude and with Alpha Omega Alpha honors. He completed both his internal medicine residency and cardiology training at Columbia-Presbyterian Medical Center. Steve joined the New York-Presbyterian team in 1979. In addition to being a member of the Economic Club of New York, he is a member of the Board of Directors of the Greater New York Hospital Association and serving as its president beginning in June 2016. He's a member of the Governing Council of Health Care Systems of the American Hospital Association. He's also a

Fellow at the New York Academy of Medicine, a member of the Association of American Medical Colleges Council of Teaching Hospitals Administrative Board, a member of the Health Management Academy, a member of the Advisory Board for the Morgan Stanley Institute for Sustainable Investing. He's received numerous awards and honors, including the Hope and Heroes Award for promoting excellence in pediatric oncology, and the VHA Award for Clinical Quality for the design and implementation of the emergency department protocol for chest pain diagnosis and treatment. And that's actually an abbreviated version of his incredible biography.

We're pleased to welcome, as our interviewer, this morning Melanie Evans, who is a reporter for the *Wall Street Journal*, covering hospitals and the practice of medicine. Dr. Corwin and Melanie will save the last 15 minutes, as is our tradition, to take questions from the audience, with the first question coming from the Economic Club of New York's Fellow, Trin, who we have in the room, one of 27 fellows in our new Fellows Program.

As a reminder for everyone, this entire program, including the questions from our members and their guests is on-the-record and is being carried Live on Facebook. As always, we'll conclude promptly at 9:00. With no further delay, Steve and Melanie, the floor is yours.

Conversation with Dr. Steven Corwin, President and CEO, New York-Presbyterian

DR. STEVEN CORWIN: Well, thank you for having us here today. My mother would have

preferred a longer introduction. (Laughter) But thank you, I appreciate it.

MELANIE EVANS: Do we need a microphone?

Yes, definitely.

MELANIE EVANS: Okay, I just wanted to make sure. So, we're going to talk about technology today, but we're also talking about healthcare. So, healthcare costs are oppressing and ____ concern for businesses and households and _____. It seems that technology has the potential to reduce those costs, but also to increase them. Do you agree?

DR. STEVEN CORWIN: I do. And let me sort of parse this in all the different ways. The first is if you look at a major hospital system like mine, 60% of our expense is labor expenses. So, in order to get the cost structure of a hospital system down, you have to look at labor expense as a key issue. And traditionally hospitals have been looked at as low productivity industries. So, a nurse taking care of a sick patient is the same ratio as it was ten years ago or twenty years ago. The environmental service workers are about at the same ratio as they were ten or twenty years ago. So, one of the issues for us is in this world of disruptive technology, if you use artificial intelligence, machine learning, and a variety of tools, can you become more efficient? Can you become more productive? And can you, therefore, lower your costs and lower the cost of care? We believe that that, in combination with telemedicine, can dramatically reduce the cost of care.

And if it doesn't, then I think that it will be a failed experiment, but I really believe that we will be disrupted by this and it will reduce the cost of care. What Melanie also referred to is there are a lot of innovations that cost money, and innovation comes with a price. So whether it's a new pharmaceutical that treats hepatitis C or whether it's a new T-cell therapy for certain cancers, these are very expensive therapies. Proton therapy for cancer, there's a proton center going up at 127th Street and Third Avenue. That's a \$200 million facility. So there are many things on the technology side that will push up the cost of care because innovation tends to push up the cost of care in healthcare. So you have countervailing forces there.

MELANIE EVANS: You mentioned telemedicine. You've introduced virtual visits for primary care, home visits, to telemedicine virtual visits in the emergency room. Are these lower cost alternatives to in-person? And if they are, are they lower cost to the institution? To the payer? To the patient?

DR. STEVEN CORWIN: Well, I think they are lower cost alternatives. And I think, let me just sort of level-set this. Our feeling behind this was that with virtualization or use of the internet, that you would have a similar situation in hospitals and hospital systems as you have in retail, and that the use of the internet and virtual visits was going to dramatically change healthcare. And if you follow the retail analogy, our feeling has been strategically that the amount of bricks and mortar, which in our case are hospital buildings – ambulatory buildings and hospital buildings – in the retail case, it's stores, you wrap around that a whole suite of virtual services

and then you wrap around that really the best customer service or patient service you possibly can. So, strategically that's the way that we think it's going to go. And then if we just stuck with the bricks and mortar approach, that it was not going to be effective for us. Having said that, we think that telemedicine affords an opportunity for lower costs. The visits will be less costly than a physician visit, that we can off-load our emergency departments, that we provide a more effective and timely care. Think about a couple of different things. In the emergency room setting, we can take advantage of an emergent care visit in 25 minutes, where ordinarily that would be a two-hour turnaround time. Psychiatrists are very difficult to obtain, especially in an emergency room setting, and especially for children and adolescents. So we only have about 6,000 child and adolescent psychiatrists in the country. We can offer child and adolescent psychiatric services to all of our school-based clinics. We can have one psychiatrist for every ten school-based clinics. You can't do that in a physical world. And think about a relative or a friend who has a condition like congestive heart failure, mother, son, daughter has to take off a day from work to get the patient to the doctor's office. It's \$45 for parking. You see the physician in about 20 minutes. The physician spends about five or six minutes dealing with the core of the problem and then a lot of it is making another appointment, getting laboratory tests, getting dressed and undressed. Imagine if you could do that visit in the patient's home. Well, we can do that now. And imagine if the physician can spend the key medical part of the visit – six or seven, eight minutes – and then a pharmacist, a social worker, a nutritionist via telemedicine can deal with the rest of the patient in a holistic way. So, not only do we think it's less costly and the physicians will be reimbursed less, we think that the scales, that the patient care will be better – higher quality and

lower cost.

MELANIE EVANS: You mentioned labor costs as an expense in healthcare, inside of hospitals. So, can technology replace jobs that are done in the hospital today in a way that may lower the labor expense?

DR. STEVEN CORWIN: I think we're struggling with this as a society. So, whether you're a techno-pessimist or techno-optimist, do jobs go away with the application of artificial intelligence, machine learning? I think the answer to that is they do. They will be replaced by different jobs, new jobs. Whether there's a net loss or gain, I'm not smart enough to say. But in the healthcare setting, I think there's going to be a net loss and I'm concerned about that. So we're already starting to figure out what our labor force will look like in three or four years to avoid a situation where we would have to dramatically lay off people. That being said, I'll give you a perfect example and you see this in other industries. Remember, this is not just about artificial intelligence, machine learning in the diagnosis and treatment of disease. Robotic process automation for the revenue cycle is a key thing that's happening now. So, as an example of that, we have instituted, we have centralized timekeeping. That's for all of our employees to monitor time at work and overtime, etc. We had 120 people doing that for 45,000 employees. We now have 20 doing it. Robotic process automation can do insurance clearances in about two minutes. A very productive person right now in our Finance Department can do 70 insurance clearances a day. So you can do an insurance clearance in two minutes, 24/7, 365, no sick time,

no vacation time, that's going to be hundreds of jobs. Where do those jobs go? So, I think that these things are already upon us. We are employing robotic tools for cleaning. So we have robots in our new buildings that do, that are cleaning robots. These are things that you're seeing in other industries, and our industry is no exception. So I think it's going to reduce costs.

MELANIE EVANS: What about the use of technology in the practice of medicine? So, are there basic decisions made by a physician or nurse that could be settled using technology, using an algorithm for example? Is that something you've explored? And if so, what is ____?

DR. STEVEN CORWIN: Well, the answer to that is yes. I think that we will have AI-aided diagnosis so there are some good examples out in the marketplace. AI-aided diagnosis of dermatologic, you know, skin cancer, if you have melanoma, that's a perfect example. I think we're getting there in radiology readings. So anything that involves pattern recognition similar to facial recognition, I think you can see software algorithms that we'll apply that will aid humans in the diagnosis. I do think that we have to be careful, as we apply these algorithms, to make sure that we're not inserting our own biases in these algorithms, and that is a key concern of ours. So, for example, we use an AI machine learning algorithm to help reduce the length of stay of somebody in a hospital. It can identify obstacles to somebody leaving the institution. As you explore that, is there a bias against non-English speaking patients? Is there bias against people of color? You know sometimes you don't know how the algorithms actually reach their solution and so that is a concern. But I do think that we will see the first applications of this in terms of

medical diagnosis on things that rely on image or pattern recognition – pathology slides, radiology, dermatology. We already use artificial intelligence on things like interpreting a blood slide. So, on a blood slide, white blood counts are important. And the white blood cells have three or four different types. These AI algorithms can actually determine which type of white blood cell is present on the smear and then somebody over-reads that. So it dramatically reduces the number of people you have to read these things. So, again it deals with labor and it also deals with can you reach the right diagnosis? And can you have AI tools that assist somebody in making the diagnosis?

MELANIE EVANS: So, the next question then becomes, can technology answer questions that doctors and nurses cannot? So, is it possible that algorithms may do a better job of predicting which patients, you know, the course of patients, the trajectory of a patient's illness? I don't know if that is work that you're developing. And so would you talk a little bit about how...

DR. STEVEN CORWIN: So, the question really gets to can you develop new insights or insights that you might not have had? And I think the answer to that is yes. So let's take a look at what Google did with DeepMind. So, the game Go was felt to be a game that would be very difficult for a computer to simulate. And by loading tremendous amounts of Go-games into Google DeepMind, the DeepMind algorithm was able to beat the world's most proficient Go players, which people thought was going to be quite a while in coming. More interestingly, to me at least, was the next experiment was if you just gave the learning algorithm the rules of the game, the

rules of Go, what would happen? What happened was that with those rules the machine would play against itself and actually develop its own strategies and came up with some insights that typical, that the most proficient Go players didn't have. So, I think the same thing is going to apply in artificial intelligence- machine learning in terms of diagnosis and treatment. I do think right now there are prompters. With the right data inputs, you can predict things that somebody might be slower to predict – trends that may yield to a bad outcome, etc. And we see this in the ICU setting. But also I think you can clearly see that there may be things that come up with new insights into disease. And then the question becomes is that insight beneficial or not? I still think we're a ways away from removing human control of ultimately making the diagnosis.

MELANIE EVANS: You discussed AI a bit this morning and it's a term that gets used frequently. And at least as a healthcare reporter, a tech reporter, it's a term that I think bears defining. So when you talk about AI, what type of capability are you describing? And how far along are the tools in healthcare to kind of meeting the exponential promise of artificial intelligence?

DR. STEVEN CORWIN: Well, I still think we're a ways away and I think that when you deal with complex diagnoses, the essence of AI, to me, is you take large amounts of data and it's got to be curated data. So the data's got to be good. And you take large amounts of data, you have an enormous computing power now. You put that with some of these neural networks and you come up with the ability to make predictions, predictive analytics. And that's the essence of this, your

diagnostic. If the data is not good, it's difficult to come with these answers. And one of the issues, for example, with a cancer diagnosis is what you want to do is correlate somebody's phenotype – what they actually have – versus the genotypic information that you can get from doing a genomic screening. The problem heretofore has been that the phenotypic information – what does the person have – is not that readily available. And just to cull that information from the electronic record is not sufficient, it's not sufficiently accurate. And so you have to do a lot of curating of the information in order to input the information to detect these associations between what the person has and what the genotypic information is. So, I still think on some of these more complicated things, we're a ways away. I actually think that, but it's inexorable, it will happen. It's going to develop. As our computing power increases, the ability of these algorithms increases. So, I think that from my standpoint a hospital system like ours has to be at the forefront of that. I don't see how you can avoid this wave coming.

MELANIE EVANS: So for a hospital system like yours, does that mean then that you build it in-house? Does it become sort of as essential as other classic functions of a hospital? Or is it something, do you build or you buy it?

DR. STEVEN CORWIN: I think buy it, but I think you buy it with the notion that you have people in-house that are capable from the standpoint of data science, people in-house that are capable of discerning what's good to buy and what's not good to buy and what kinds of applicability? Because if we build that capability in-house, we're not going to try to build this on

our own. I think you do have to buy and you have to buy, as any consumer would buy, with the knowledge that you have people that can advise you. I certainly am not somebody that is technologically proficient in terms of really understanding these tools. But I think we'd hire good people to do that. One of the concerns that I have on this is that you really will separate have-hospital systems from have-not hospital systems because you have to invest a lot of money, time, and energy into these things. And we have to be careful that we don't create further disparities in healthcare especially for underserved communities by applying these tools.

MELANIE EVANS: So, as you have sort of scouted out your options, are you working with anybody interesting? Are you testing any sort of products in development that might be, that might be used for a new breakthrough, in order to manage the operations or managing the care of patients?

DR. STEVEN CORWIN: We are. I'm not at liberty to mention the companies but I think that our philosophy on this has been to co-develop things with companies that we're interested in. So we do spend time in Silicon Valley. We do look particularly at companies that we think can apply a solution for a problem that we have. We want to align it with what we think our strategic goals are and our goals are in patient care. And we think we have something to offer in terms of the co-development of some of these tools. So that's really where we've focused. What I'm not willing to do is get into the venture capital investment business. There are plenty of people who are far smarter than we are. But I did want to get involved with companies that we thought could

bring real value to patient care.

MELANIE EVANS: You mentioned that AI requires a lot of data and good data. So what data does the hospital have today and where do you get it?

DR. STEVEN CORWIN: Well, hospitals are data factories. And one of the reasons that we're such rich targets for people that want to do nefarious things – cyber crimes – is we have a lot of information. We have a lot of patient information, clinical information, from things like X-rays, all the diagnostic tests, all the laboratory tests, everything that's in the electronic record. We have people's financial information because they have to pay bills. We have their insurance information. So we are a treasure trove of information. Using that information is important for us, but also we have to recognize, we have some fundamental obligations. One, we have to protect our information from either internal bad actors or external bad actors. Two, we have to protect the privacy of everybody's information. And we are now going through that as a country. I personally think the ____ is the correct direction for us to go, and I think that we are too loose in terms of privacy and how your information can be used. And as my father used to tell me, nothing in this world is free and your data on Facebook clearly is not free. So, these things occupy us tremendously, and protecting our patients' information, I think, is one of the sacrosanct obligations that we have.

MELANIE EVANS: That an excellent segue to my next question, which is how do you do that?

Is it, I mean whac-a-mole is like an understatement, right, that you're sort of getting kind of threats coming from all directions. How do you invest as a system, particularly given that the hospital itself is increasingly networked and people within it are increasingly networked? How do you build up an adequate defense?

DR. STEPHEN CORWIN: Well, you have to build up your capability and that involves investing money. So healthcare organizations typically invest 3 to 6% of their IT dollars in cybersecurity. Banks are in the 10 to 12% range. We're now in the 10 to 12% range. I feel very strongly about this for the reasons that I mentioned before. That's the first thing. Four years ago, we had five people doing cybersecurity, today we have 55 people doing cybersecurity. Four years ago, we had \$3 million worth of cybersecurity insurance. We now have \$125 million worth of cybersecurity insurance. The electronic systems that we have are our lifeblood. If they go down, that is really, it creates a problem for us. So, you know, in the city of Atlanta, you saw a week's worth of a problem with a cyber attack. Erie County Medical Center had weeks' worth of a problem, being shut down by a denial of service attack. So, I meet with our Chief Security Officer, Information Security Officer, with Counsel, and with the Chief Operating Officer, and the Chief Information Officer every other week. And we look at what the threat levels are, what the new attacks are. We look at our own metrics in terms of things that are mundane but important like server patches and how current we are on server patches, dual factor identification, a range of things that have to be put in place to make sure that our data is secure. And I worry about this all the time and we should. I was telling Melanie the other day, 91% of

the emails that come into our organization are rejected as either SPAM or malicious or in some way problematic – 91%. And email now is the most currently favored vector of attack. And so, it's a big deal and we have to pay a lot of attention to it. And these are state actors. These are state actor proxies. These are just bad guys. So, there's a lot there. And we would be brought to our knees with a significant attack that was successful, so it's something that I worry about all the time. As much as I worry about the physical security of our facilities, I worry about this.

MELANIE EVANS: So, on that same subject, I wanted to talk about medical devices because, you know, everything from CT scans to infusion pumps are now networked. It's an interesting area because of the, you can sort of think of it as like, it crosses multiple, essentially jurisdictions, for lack of a better word. So you've got the devices that run on what may be off-the-shelf software, operating systems. Those operating systems may sort of, at a certain point, no longer be supported by the companies that developed them. You've got products, the medical devices themselves, and the companies that manufacture those products develop the patches, but it's the hospitals themselves that are responsible for installing the patch, which can be disruptive. And so, how do you, this is an area of, you know, particularly, kind of an area of discussion. So, how do you evaluate the cybersecurity attributes of medical devices as you purchase them?

DR. STEVEN CORWIN: Well, we will not, about a year and a half ago, we initiated a policy where if our information security people felt that a device had software that was not requisitely secure, that we would not buy it. So we recently had a situation where we did not buy a

particular product because it was not secure. The problem is that, and we and some other institutions in the country along with the device manufacturers, are pushing the following notion. You don't know whether a device is operating correctly or incorrectly in the internet environment unless you fingerprinted the device beforehand. So (a) we think that all the software devices should have a bill of particulars. This is what's in the device. And (b) this is how it operates when it operates normally. So that when it is in this system, if it's operating abnormally, you can detect that. We currently can. So we've been pushing that, and I think the FDA will help, and I think the major device manufacturers will help. This is important for all of us. And, as you know, with the Internet of Things, if you can co-opt the device or a set of devices, you can create a denial of service patch. You can create a range of things that are highly problematic. And so you're only as strong as your weakest link. So we think that medical devices and many other things is a specific threat and that fingerprinting these devices, having a national standard around fingerprinting and, therefore, how does the device act when it's normal or abnormal, is critical. What we do now is, if somebody won't give us the software bill of particulars, and we're concerned about security, we just won't buy it. And unless there's an overriding reason that this is the only product in the marketplace and somebody makes a compelling case to me, if the Chief Information Security Officer says this is a dangerous device for us to put in place, we will not do it.

MELANIE EVANS: So, for those who aren't familiar, can you describe what a bill of particulars is and why is it so hard to get? I mean, why would somebody not hand it over, a manufacturer?

DR. STEVEN CORWIN: I don't know why they wouldn't hand it over. I think that they all should. It's basically listing the software components and how the system should operate. And so the best way to describe it – and I'm certainly not a technophile – is that you're fingerprinting the device. You know what the device does. I think the larger manufacturers understand this and want to help. I think some of the smaller manufacturers may have some issues with it. And as Melanie pointed out, ultimately we have the liability if the software patch is not put in place. And the company can say this software patch should be in place, and it may take a while for them to give you the patch. So we have to have a much more robust system. And we actually think that it should be a B to B partnership. We think that everyone has the same ultimate goals in terms of patient safety, and we don't think it should be controversial at all to be honest with you.

MELANIE EVANS: You mentioned the FDA, so have you had discussions with the FDA about the fingerprinting? And are you talking about regulation or an industry voluntary approach? And is regulation necessary?

DR. STEVEN CORWIN: I think the FDA can be helpful and I think that there's, you know, not all regulation is bad, but I do think most of this should be a voluntary set of standards that are adopted and that the FDA promotes. We've had the discussions with the FDA. They've been very constructive. And I think that the current chair of the FDA is forward-thinking and I have

the greatest respect for Dr. Gottlieb. So, I think we're going to make progress on this issue.

MELANIE EVANS: One last question about devices. This came up at a recent event that I attended. It had to do with the underlying sort of software components of medical devices. It's not a new proposal, but there was a discussion, just given that some of these were kind of capital-intensive purchases, that maybe there could be, sort of at the federal level, something along the lines of a "cash for clunkers" but for medical devices. And I was interested in your response to that kind of a proposal.

DR. STEVEN CORWIN: It's a new one for me. We'd be happy to hand in a lot of our older medical devices if we can get rebates for them. I don't see that happening anytime soon. I do think, on a more serious note, that there is an obligation that the device manufacturers have to make sure that their devices are safe within the context of a connected universe and we've talked about that. There are many, you know there are many ways that bad actors can get into the system and that's one of the areas. So, I would prefer not to do "cash for clunkers." I would prefer to have an industry standard that makes sense in terms of protecting everybody.

MELANIE EVANS: All right, so talking about a medical equipment brings me to capital purchases, which brings me to purchasing. I'm just working backwards towards Amazon with this question. So, New York-Presbyterian worked with Amazon on the hospital supply chain. Can you describe some of the work that you did and why you got involved?

DR. STEVEN CORWIN: Well, our supply chain is over a billion dollars and so many of you are involved or have been involved with the manufacturing industry. So part of the issue for us is what do you purchase and at what price? Part of the issue is from a purchase to loading dock. And part of the issue is what's the inventory process within the institution? And we're interested in all of that. We think that the Internet of Things being sensorization – if you will – forces the ability to do casting inventory control and that's been tried at Boeing. It's been tried at Caterpillar. And we think that that is something that we'd like to do because we have huge inventories of a variety of things. And if you're in charge of the inventory for the operating room, the last thing that you want is to run out of something when somebody's having an operation. So, the inventory levels are going to be higher unless you have some way of monitoring that. So we're very interested in the whole supply chain. We were particularly interested with Amazon as to whether, given their logistic proficiency, whether or not they could provide some help in that. They were interested at the time in seeing whether or not they could help us with purchasing products. We had a brief experience with them and found that our ability to get pricing was better than theirs, at least at this point in time. So we've not used them for that, and so it was a failed experiment. I do think that, you know, any business that Amazon is in, one has to worry about being a competitor in that business. It's one of the world's great companies. So, if they are intent on doing B to B and intent on providing product pricing, etc., I would not doubt that. Having said that, their initial foray with us was not, did not result in any savings for us.

MELANIE EVANS: So then do continue to have conversations with them about what didn't work with an eye toward developing or sort of generating a new model?

DR. STEVEN CORWIN: Yes, I think you have to. I guess tying the whole discussion today together, we have to find every way we possibly can to reduce cost without affecting patient care. So the typical way that, with a blunt instrument, that you would reduce cost is you ration care. And I think that we, as a society, do not want to do that. I would not advocate doing that. But, being a hospital system, I have a responsibility to try to reduce cost of care. So, if Amazon or any other company can help me reduce the cost of care, yes, you have to have those discussions. And they've been successful at just about everything that they've done. If they put their mind to it, they're going to be successful here. So, I am not daunted by having an initial failure. I think that there are probably other things that we can do with them or others that will yield the savings that we want.

MELANIE EVANS: How are we on time?

MODERATOR: Good. Two more questions.

MELANIE EVANS: Okay. So, is technology the solution to opaque pricing in healthcare?

DR. STEVEN CORWIN: No. Pricing in healthcare is as byzantine as you can possibly make it

for a whole host of reasons. The first is what's the price depends on who you are. If you're a Medicaid patient, it's different than if you're a Medicare patient. It's different than if you're a commercially-insured patient. If you're a commercially-insured patient, the price you pay out of pocket may be different than something else depending on which plan within the insurance company you're in. The chargemaster, which was mandated by Medicare is a rough guide to what the cost is and the charge is and then everyone bases their charges off of that chargemaster. So, it is extremely byzantine. It's drawn out over a long period of time And I don't think technology will elucidate it. But having said that, affordable, everyone wants affordable healthcare. I think that affordability is kind of defined in a number of different ways. The first is, is it affordable to me as a patient? What's my out of pocket expense? Am I on a high deductible plan? Am I on a low deductible plan? What is this going to cost me? The second is, is it affordable to the country? That's a different question than whether it's affordable to you as a consumer. The third is, is it affordable to the health systems? So, those health systems that are taking in hospitals, taking your, maybe Medicaid patients, don't find it affordable because they have difficulty generating any sort of margin. So, I think the affordability question depends on the prism that you look through. So, pricing and affordability are two sides to the same coin. I think we've got to get into affordability. But the short answer to your technology question is unless people understand this byzantine __ pricing, it's very difficult for technology to make an impact on it.

MELANIE EVANS: I was thinking about sort of a corollary to the Amazon question, which is

that the Amazon market, you've got products in an open market with transparent prices sort of competing for business. And I'm wondering if technology may be able to crack that byzantine system in a way that would enable transparent pricing. Other than this kind of, I guess the multiple insurance products that sort of can dictate different prices, are there other barriers to hospitals competing on price?

DR. STEVEN CORWIN: That's a great question. I would say a couple of things. Just, let's take a step back a bit to the debate we're having on pharmaceutical price. So, the first question on pharmaceutical pricing is does the E.U. pay what the U.S. pays? Does Indonesia pay what the E.U. pays? What does Canada pay? So, that's the first set of issues. The second set of issues is what rebates are the pharmaceutical companies offering the various pharmacy benefit managers? The third issue is, is there generic competition? And how soon can generic competition come in? And will that lower the price? And you saw with what the President and Mr. Azar had put forth, that it is extremely convoluted and it's difficult to get at. So, one situation would be, well, let Medicare negotiate drug prices. Another is let's put direct pressure on the pharmaceutical companies to make sure that they're not charging more than the E.U. does. The third is let's let the market take effect. I think that the same thing applies analogously to hospital pricing. Part of the issue is what's the baseline that a particular hospital has? What's the leverage that the hospital and hospital system has in terms of its pricing? On supply chain, you have general purchasing organizations that most hospitals use, which dictate the prices that they can pay. So, I think that the Amazon approach of saying we're going to be an open marketplace for every

device, it's going to be a difficult road to get there.

MELANIE EVANS: We are going to open it up for questions.

MODERATOR: The first question will be from our fellow. If they can give their name and...

MELANIE EVANS: This is...I'm connected to a wire, so I'll repeat your question.

I'll try to speak loudly. I guess in this world of social media outlets, would you comment on or talk about your social media strategy with respect to perhaps liability management or even marketing and branding?

DR. STEVEN CORWIN: The question was social media strategy concerning branding and liability and how to approach it. There's no question that in this very interconnected world, as doggedly as one tries to build up your reputation, it can be destroyed pretty quickly. One of the most recent examples that struck me was the example of what happened at Starbucks and how they responded to it. Now, Howard Schultz is a very, I mean he's a terrific guy, in my opinion, and he runs a terrific company, and you saw how devastating that was in terms of the way that the company was perceived. I think they responded to it well. But that's one of the issues you have with the viral nature of what can happen with social media. So we look at that all the time, and we have people that monitor what the perceptions are there of us on social media. And it's

something that is, I think, important for any CEO in any business to keep track of. In terms of marketing, I think for hospitals it's a double-edged sword. I'm reluctant to say that, you know, I think that our marketing strategy has been let the patients tell their own stories and then let the consumer make up their mind. I think it's a much better strategy than beating our chest and saying we're number one in this or number two in that. I think ultimately it comes down to the patient. And my value system is such that it's about whether the patient is well cared for. So, I think there's a defensive side to social media and playing offense, but the liability issues are magnified tremendously by social media.

QUESTION: Yes, Bill Harmon. I wanted to just ask, there have been an awful lot of consolidation in the healthcare delivery system – Northwell, Mt. Sinai, NYU, and Presbyterian as well. Do you, are you convinced that their economies of scale are being achieved? And is there sort of a standards and controls that have to be implemented in smaller hospitals that haven't had the advantages that you all have had over a long period of time? How difficult is that? And do you see, in the long term, that that's going to be cost effective and a greater delivery of quality healthcare?

DR. STEVEN CORWIN: So the question basically was, is the consolidation, where is the consolidation of the industry at this point? And will that consolidation yield, bear fruit in terms of lowering cost? I think there's vertical consolidation, there's horizontal consolidation. The horizontal consolidation is hospitals acquiring hospitals. So we have done some of that, as has

Northwell and NYU, I think there are positives and negatives to it, which I'll get into in a second. But there's also more vertical consolidation and that's CVS-Aetna. That is, you know, Optum-United and the purchasing of a lot of medical practices and surgical care units. So, I think that there is a lot of...CIGNA-Express Scripts...so I think you are seeing upstream consolidation to try to get the patient in the more primary care or preventative stages, which I think should yield a benefit. I think that everything we that we've talked about today is that you cannot add economies of scale unless you have size. And part of that is, we talked about cybersecurity. A small hospital, there's no way that they can do this. Purchasing clout, they can't do that. The opponents of horizontal consolidation would say that it's price-raising because you're charging the insurance companies more. I don't think it's that simple at all. I think that part of what we need to do in horizontal consolidation, and I'll talk about the New York area, is, you know, Brooklyn is a borough that has as many denizens as the city of Chicago. It's as large as the city of Chicago. Queens is as large as the city of Houston. You've got to have great hospitals. You've got to be able to deliver great care in every neighborhood in New York. And part of our rationale in consolidating was just that. And the New Yorkers in the audience recognize that we have a crisis with the MTA, which is a key part of our infrastructure, a crisis with New York City Housing Authority, which is key piece of the infrastructure, the last thing we need is a crisis in healthcare in terms of the healthcare infrastructure. And so part of what we need to do is make sure that we have a strong healthcare infrastructure. And when you have a borough as large as Brooklyn that needs great hospital care, that's something that I feel very strongly about. And that's a positive of the horizontal consolidation because we have the money that we can be able

to put into Brooklyn. So we'll put a billion dollars into the hospital that we have in Brooklyn and we're probably putting a half a billion dollars into the hospital we have in Queens. We think that's good for the citizens of New York.

QUESTION: My question has to do with the role of doctors going forward. You had talked about the role of artificial intelligence in imaging. A computer that has seen millions of images of a malignant biopsy or malignancies with confirmed biopsies can potentially be much more accurate than a doctor who has only seen a handful of malignancies. But if you apply the same logic to doctors and the potential for algorithms to give next steps, tests if you will, based on symptoms, and that can potentially be very accurate and very effective from a cost standpoint, how do you see the role of doctors going forward?

DR. STEVEN CORWIN: So with all this artificial intelligence and machine learning, how do we see the role of doctors going forward? Well, let me say a couple of things. First, human beings have empathy and algorithms don't. Human beings have a curiosity and algorithms don't. So, I think that, and I like what Klaus Schwab has said at the World Economic Forum, is our values need to inform how we develop and use these tools. And I think that I view this as aiding humans and not replacing humans. I also think that these tools should re-humanize care as opposed to dehumanize care. So I want a doctor to be able to do what he or she does best and to use these tools to the best of their abilities. But I think that these two things can marry effectively to provide better care, higher quality care, etc. Do I think we need doctors? Yes. An interesting

question would be, are we going to need as many radiologists or as many pathologists? And I think the answer to that over time is going to be no, but I think we're still going to need a lot of doctors. But I would just remind us that what makes us human beings is our general intelligence and our ability to have empathy, curiosity – things that at least at this point in time these machine algorithms do not have. And the essence of medical care, to me, is the human to human connection and the ability for somebody to put trust in somebody. And I feel very strongly that one of my roles leading a hospital system is to provide our patients with the very best doctors, and we spend a lot of time thinking about that.

MODERATOR: Audience?

QUESTION: You described your business as a data factory and presumably with more ___ who have more data. At what point will we know enough about ___ to sell me a direct subscription so that I wouldn't have to buy...go through an insurance company ___ pricing?

DR. STEVEN CORWIN: That's a good point. I think there are two pieces. I think that, ultimately I think everybody should have all their own information. I think it's your information, not my information. And I think that, I've always been the advocate of you should have all your information electronically and that your records should be portable. So that's one aspect of that. The second thing is, you know, how do we get to a point in this country of eliminating the insurance company as the middleman. I don't see that happening in the near future. Let me tell

you why. I think that employer-based healthcare is the boulder of this system. We have 165 million Americans on employer-based healthcare and it's the driver, and it tends to be the rock of the system. You know, 75 million people on Medicaid, 75 million people on Medicare. So, I think you're going to have those three components. I think the argument that we've got to get to is how do you get to universal coverage with a private-public partnership? And can we make it affordable for average Americans? And right now, I think 40% of the country has difficulty writing the \$200 check. We've got a problem because healthcare is just not affordable for a lot of people. And that's why I felt that Medicaid expansion was an important thing for us to do, and I still think it's important for us to.

MODERATOR: Thank you very much.

DR. STEVEN CORWIN: Thank you very much. (Applause)

MODERATOR: ...mention, we do have a couple of upcoming events, one of which is June 19 with Lloyd Blankfein, Chairman and CEO of Goldman. And with that, thank you all for joining us. Thank you.