Future of Health Technology Symposium
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Yulun Wang:
I'm going to be focusing in on one particular type of capability and application of robotics. And then to kind of frame what I'm going to be talking about relative to healthcare. A lot of this morning's presentations were really more focused around driving preventative care, which is clearly one of the areas the healthcare system has to work in is driving people to take more control of their own healthcare so they don't have to go into the healthcare system. What I am going to talk about, though, is actually when that happens, when the patient has to go and interact with our healthcare system or, for example, go see the doctor. The problem is that with the aging population and with all these things we all know about, the challenge of having that patient/physician interaction to happen on a timely basis with the right physician, that means either your own physician or the right specialist, is becoming harder and harder. And the cost of doing that well is really very difficult. I think, especially, as the people from the CDC know, is that we actually have the ability to deliver much better healthcare than we do. It is really the inefficiency of the process which is doing that.

So what I am going to talk today about is this technology which we call Remote Presence. Remote presence really uses three technologies: the robotics, the Internet, and wireless in order to enable physicians and healthcare professionals to be anywhere at anytime. Without talking too much about that, what I'd like to do is kind of demonstrate it. First what I'm doing to do is I'm going to go ahead and - John, it looks like someone is on my robot back in Santa Barbara. We have a demo robot in my office in Santa Barbara, and as you can see here, this thing is saying that it is busy because people pop into it all the time. I reserved it.

Ok, it looks like we're alright. Someone probably just got off it.

So what I'm doing right now is, I have a robot in my office in Santa Barbara. We built a little room which looks like a little showroom, a little room which looks like what a hospital might look like. With my computer here, I've gone ahead and logged onto that robot. I am using the wireless network here, so if any of you are doing quick downloads on your computer, please don't for a few minutes here. I am actually going out over your network, over the public Internet, and I am dropping down into my office.

I am connected to this robot that is plugged in. I am going to unplug myself. I'm going to show you first what I look like. I'm just going to drive over here. I've got a little joystick on my computer which is how I'm moving. I'm actually driving around, and I've got a mirror here. You can see what I look like. Here I am. I can go ahead and zoom in on my

face. It's that lower image which is being projected onto the face of the robot. So now you know what I look like. I've got an omni-directional drive system so I can actually even move sideways here. Now, let's first just test my eyesight. I can go ahead; I have a little eye chart there. I can go ahead and zoom in on the eye chart. I can read that. You've got pretty good resolution up there too. I can see and I can see quite well.

Now, let's go and do something that a physician might do although we are moving towards electronic medical records, or want to. As you know in many areas of the country they don't. They transfer in a patient in the emergency department who comes with some films, ok? But the remote physician wants to see those films. I can actually zoom in on the films. I can take a look at it; I can actually even take a picture of that film. What that does is that the resolution not only goes up, it stores the image but I can also do things like interact with the remote location with that film. What I've done is I've put that film on my face so now if you go back and look at ourselves, we have a face which looks like a film, and I can actually draw. This is a bearing film; this is the area I'm going to look at. So I've telestrated, I've captured a picture, I've put it on the face of the robot and I can telestrate on it. So, I can convey the information.

I see Steve walking around. Steve, is that you? Hey, how's it going? Oh good, you are just in time. I actually wanted to show something here. I'm at the CDC. So, here's an EKG. I can actually look at an EKG strip even though it is on paper, and we can take a look at Steve here. Steve? Steve? So I know that Steve hurt his neck; he took off his neck brace so I already can tell from a healthcare perspective that you must be feeling better, Steve.

Ok, let's go over to the patient side for a second. Maybe I can ask you to demonstrate being a patient for a second there, Steve. So here's our patient. The patient is not feeling very good. I can check the fluids of the patient's body. I can go right up to the side of the patient. I can look at the patient's monitor so I can see what the blood pressure is, what the pulse might be. It turns out that a lot of neurologists, neurosurgeons, stroke specialists are using our system. You can, for example, look at the eye for a pupillary response or what have you.

Hey Steve, can you help me out for a second here? What we are also doing is we are starting to add devices onto this system, so on the back of me, I have hanging off here - why don't we show an otoscope? So, what we have here is a video otoscope. This otoscope is like what you'd see at a normal doctor's office but instead of having an optical lens, it has a video lens. I am going to ask Steve to go ahead and stick that in your ear, Steve. He is sticking it in his ear, and then I can see the inside of his ear. There's his ear drum, and if I knew more about it, I'd be able to say something more intelligent but you can see the inside of his ear very well. We've had physicians take surgical images; other people take dermatologic images.
Let's try something else here which is kind of fun. We have a stethoscope as well. We are going to see if we can listen to Steve's heart. I am going to flip this audio over here. I'm going to start it. Can you guys hear it? There's Steve's heart beat. Obviously, it's not

as good over the speakers of the auditorium but we have a lot of physicians using it to check the heart and lungs of their patients this way. Steve, thanks a lot.

I'm going to move on here. I'm going to disconnect. That was Santa Barbara, 3,000 miles away. You can imagine if I was a physician and that was a real patient, I could actually do some real stuff there.

The premise here is that if you can get that physician and the patient there at the right time, the right physician there at the right time at the patient's bedside, you can really improve the delivery of healthcare. We are really focused, principally, in the hospital setting but you can imagine how this can apply to nursing homes, and even eventually homes, homecare. But within the hospital setting, and we've talked to a lot of hospital CEO's and clinicians, and the areas where they are focused on are things like patient safety. To err is human. We want to eliminate those errors. Hospital throughput is also a major issue with regards to if you have a limited resource dealing with providing healthcare to more people, you've got to get through that load faster with regard to patient satisfaction and physician efficiency. So we are taking this concept of enabling the physician to be anywhere at any time and then applying it to these types of challenges or initiatives that they have going on in the hospital.

The typical locations where these robots are placed in the hospital are usually in the ICU, the Emergency Department, or on the MedSurg floor. The physicians now are often either at home, or they are in office, or another hospital, or what I just did. They could be anywhere. They could be in an auditorium. They could be anywhere they have Internet access. And so by allowing this to happen, again, being able to connect to the Internet, as it turns out and we didn't know this when we started the company five years ago, is that the Internet is powerful enough to support very large distance interactions. So we've had remote presence interactions from as far away as China, Japan, the Middle East. I think last week one of our physicians was giving a talk in Bangalore, and he's the Chairman of Surgery in LA Children's Hospital, and from Bangalore, from a podium like this, he beamed into his hospital in Los Angeles. He was able to round on a patient and do that type of thing.

So, the integration of clinical data is something that we also do a lot of where we are able to enable a physician who now is pulling up electronic medical information while interacting with that patient remotely. So, that physician isn't just getting his or her information just through the robot but is also able to pull up fax images, notes, laboratory information, and is, therefore, able to advance care in the same manner that he or she would if you were present. So to talk about this a little more from a clinical perspective, I have a Dr. Neil Reynolds, who is a Professor of Critical Care Medicine at the University of Maryland who is going to join me. He is working. He is actually at his hospital. Obviously, he can't be in two places at once in reality, so he's actually going to come in. He's going to join us as a robot. He is in Baltimore right now. He's a user and helps us in the development of the system. What I've asked him to do is to give us some of his own experiences and thoughts about how remote presence can apply in a

clinical setting. So, Dr. Reynolds, thank you for being here. I can pull your slides up right here. Maybe I can turn the floor over to you?

Dr. Reynolds: Indeed. I think you need to go back to the first slide. Good afternoon. (Inaudible)   Ok, I have about 5-7 minutes as a user. I'm going to give you a very high-level discussion of a (inaudible) for a couple of hours. I'm going to give you a couple of precepts here about me.

Dr. Wang: Thanks for your time. We're going to keep going here because of a shortage of time. Thanks again for joining us. I'm going to switch back to my presentation and go through a few more quick slides. Actually, Dr. Reynolds did a very good job of tailoring his talk, it was a little different from what I've heard in the past, for the CDC because you can imagine how you can think of a network from the CDC perspective, perhaps a national-sized network as opposed to a state sized network where you can bring various unique expertise anywhere in the country kind of instantaneously.

Where the systems are being used most regularly are in the ICU and Emergency Department, and just to kind of give you a couple of examples of that I am going to look at two studies which have recently been done. One is at UCLA where they did a study with the robot in the neural critical care unit. They tested the results of 600 patients before the robot, to 600 patients with the robot in terms of things like mainly around issues of how the robot was useful and what type of throughput impact it had. The first thing they noted, though, was that of the 600 remote rounds with the robot they asked the physician was the most important piece of data visual or verbal. In 70% of the cases, it turned out to be visual. The point there is that is when a phone call doesn't solve the problem because you can't see what you are talking about. This was the response time of an attending to the patient in the dark black. Basically, it's about on the average nine minutes, and then depending upon the different ailment, you can see the different times on the other side which are in hours. So, the response time is quite different. It ultimately generated a reduction of length of stay somewhere around a half a day over the comparison of those two groups which ultimately resulted in a savings of about $1.1 million. The patients were categorized in things like subarachnoid hemorrhages, traumatic brain injuries, stroke, trauma, etc., and then they got also in addition to that an 11% increase of capacity with that same ICU.

The other example I want to go over is we are about two-thirds deployed in a stroke network. This is centered out of St. Joseph's Hospital in Pontiac, Michigan where we are deploying 30 robots to connect to about 25 rural sites throughout the state of Michigan. The problem that they are dealing with here is that stroke is the third-leading cause of death, and is the first-leading cause of disability. The fact is that there could be greatly improved outcomes if the speed with which you could bring the neurologist to that stroke victim could be improved. There's the saying within that community: Time is brain. There are things like the administering of TPA, which is a blood thinner. If you can get it to the patient within three hours within the onset of stroke you can have significantly improved outcomes. But many of these outlying facilities, in fact most of them, don't have neurologists and, therefore, aren't able to do the administering of TPA

within that period of time. So, the St. Joseph's Medical Center is deploying all of these robots out there to connect their comprehensive stroke center to these outlying places, and in doing such, it improves the patient care. It improves the ability of the remote sites to provide better care, and it actually improves the referral pattern to St. Joseph's. So, obviously, like everything, there are economics involved in this.

Just to kind of wind up, I think this idea of remote presence is just really a new form of communication. I think all of us are familiar with this idea of Star Trek where if you can just instantly beam someone somewhere else, it would sure help a lot. We are obviously applying that concept to healthcare. By doing that, if you can really reduce the time space boundary, if you will, of communication and delivering good care you can create this kind of a worldwide network where you can bring the right care to the right person at the right time. Things like this are happening. You may have heard of a company called Nighthawk, which is a radiology company. A scan is taken during the day maybe here at Emory, and then at nighttime it is read by a radiologist in Australia. By morning the scan is already read. The point is that healthcare is not only becoming nationalized but internationalized. I think that strand is only going to continue. We were recently participants in a tradeshow called Arab Health, which is in Dubai. It is one of the big Middle Eastern tradeshows where both Johns Hopkins and Methodist out of Houston were using our robots to project into their booths. Their intention is to do international outreach other healthcare systems to these other geographical locations.

So, with that, I'd like to end. Thank you.

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