Improving Care, Saving Lives with Artificial Intelligence with Dr. Jim Jirjis – Hospitals In Focus Transcript

Chip Kahn (00:11):

Hello and welcome to Hospitals in Focus. I'm your host Chip Kahn. Today we'll be discussing a true revolution in healthcare driven by the use of artificial intelligence and big data. We are hearing more and more about digitization changing so much in our society, but what does this mean for the health care of individual patients and how do we promote this innovation for the positive while ensuring patients their safety and privacy? Joining us today is an expert, someone who is harnessing the power of AI and big data for the largest hospital system in America, Dr. Jim Jirjis, the Chief Health Information Officer of HCA Healthcare.

Jim Jirjis (00:55):

Thank you, chip. Thanks for inviting me. Glad to be here.

Chip Kahn (00:57):

So glad you're here with us today, Jim. Let's get started by talking about your role at HCA. What do you do as the Chief Information Officer and what led you to this position?

Jim Jirjis (01:09):

I think it's pretty common knowledge that healthcare is an information intensive industry. There's a variety of information. And the role of the chief health information officer is to understand how to acquire, store, and prepare that information and deliver that in real time sometimes to promote better outcomes. So that's what I get up every day doing, how do we take our data and information, how do we present that to nurses, staff, physicians to improve outcomes and efficiencies?

Chip Kahn (01:41):

Jim, for our talk today, let's define artificial intelligence. It's a common term that is often thrown around quite a bit. So does AI mean robots doing surgery or is it something else?

Jim Jirjis (01:57):

Well, that's a great question because I think when you look at Hollywood and you look at AI, there's various robots that you can't tell them apart from a human. That's not what we're talking about here. And I think there's a lot of misconception so I'm glad you brought that up.

Jim Jirjis (02:10):

Artificial intelligence is simple. It's having computers do what they do well and staying in their lane. And what that means is computers have an uncanny ability to rapidly sift through enormous amounts of information and find patterns that humans wouldn't naturally find on their own without either hundreds of hours or really ever. And artificial intelligence is about harnessing the power of the computer to find those patterns.

Chip Kahn (02:39):

People might be familiar with other health information technology buzz words like machine learning, HIT, and augmented intelligence and big data. How do those compare with artificial intelligence?

Jim Jirjis (02:54):

I think this is one of the most important questions you could ask because with a lot of discussion happening about what's the role of AI, there's important distinctions in here that sort of de-Hollywoodize this, if you will.

Jim Jirjis (03:07):

So big data is a term that just means that the data is either too big or too unstructured to have usual common techniques work. In other words, our usual techniques break because of the size or nature. If you've ever had a computer and had a spreadsheet that was so big that it locked up, you had a big data problem. That on steroids with imaging, real time wave forms and quite frankly, the enormity of the data, that's all big data is. Big data today will be different than it is 20 years from now. There's no mystery. It's just advanced analytics. Super advanced.

Jim Jirjis (03:43):

The difference between artificial intelligence and augmented intelligence is really the important point that I want to hone in on here. Artificial intelligence, one definition is that the computer is able to find patterns and actually take action based on those patterns, replace the human in their decision making and action. That's the sort of Hollywood, the borgs taking over if you will, that's not really what is happening in healthcare. That's not what we're about. What we're about is augmented intelligence. And what that is, is computers doing what they do well, but staying in their lane. So most of the things in augmented intelligence are computers finding patterns and then nudging the clinician.

Jim Jirjis (04:27):

And we'll get into a couple of examples I think, but wouldn't it be helpful if you had a super smart computer going around with you saying, "Hey, the patient that you rounded on four hours ago, we're detecting they're about to get sick, why don't you go assess them?" And then the human goes based on their training experience and knowledge actually does what they do, what's the nudge? That's a big difference. And I think that's a helpful framework to understand the difference between when do we need to be really concerned because we're automating something, the robot's taken over if you will, and when is it simply improving a human?

Jim Jirjis (05:04):

If you look at the definition of technology that macro economists will talk about, technology is anything that improves the efficiency or effectiveness of a human. And that's what we're talking about here, not replacing them.

Chip Kahn (05:17):

So Jim, with that in mind, let's talk about your computers. Let's drill down a little bit specifically with what you're doing at HCA. HCA is in a unique position because of its size and scale, and you have a lot of data. Can you talk about how much data you actually have and what you're doing with it?

Jim Jirjis (05:38):

I mean, when you talk about computers being uniquely positioned to handle the size and scope of the data, a lot of health systems are in a position really to improve the care for the country by looking at that data. We have a 184 hospitals for example in 44 different markets across the US and in London, 1,200 clinics right now as we sit here today talking. There are about 25,000 patients in our hospitals

alone. That's a big number. Lots of opportunity for those of us who are entrusted with the sacred task of caring for patients. That's a lot of opportunity. Two to three million admissions a year, 500 million lab results in one year, so there's a lot of data and how do you make that accessible to people? I think that the best analogy I try to colorfully use is we've got about 40 petabytes of data, and when you say petabyte, once you get over a million, it's all the same to humans. Okay, maybe really smart ones get higher, but what is 40 petabytes?

Jim Jirjis (06:40):

Well, I did the math once because I had nothing to do one day, and I took a Post-It note, and if you take it, see how thin they are, and I looked up how thin a Post-It note is, if you put one byte of HCA data on a Post-It and then you stack them on top of each other. Any guesses on how high that stack would be?

Chip Kahn (06:58):

No idea.

Jim Jirjis (06:59):

We've had people say to the moon, et cetera, and they're getting warmer. And I say warmer because it's actually 31 way trips to the sun.

Chip Kahn (07:06):

Wow.

Jim Jirjis (07:07):

Can you imagine that?

Chip Kahn (07:08):

No.

Jim Jirjis (07:09):

Someone once said, isn't that the same as 15 round trips to the sun? And I said, "Well, if you're going to the sun you probably ain't coming back." So that's a lot of data and a lot of opportunity that excites us because health systems today have the opportunity, with the power of computers, to actually go beyond what we had before and improve outcomes for patients.

Chip Kahn (07:31):

Now let's talk about using all that data to improve outcomes. On a previous episode we spoke with Dr. Jon Perlin from HCA Healthcare about how you are using scale to improve patient care, and he briefly mentioned SPOT, S-P-O-T. Will you describe how SPOT operates and what it means for patients?

Jim Jirjis (07:59):

Yeah, that's a great question. It's really exciting because if you or a loved one are in the hospital, there's this thing called sepsis that can occur. If you have an infection usually, or maybe a burn, or you're just sick enough where the body's immune system starts trying to fight and it gets bad enough that you start going into multiorgan failure and it's a leading cause of death. Where the opportunity is is the earlier

you detect that someone is getting septic, the more of an opportunity you have to have a clinician go to the bedside with their training experience and knowledge, assess the patient, get them on antibiotics, determine the cause of the infection, do blood cultures, give them fluid, and you can change outcomes. It's sort of akin as Dr. Perlin may have mentioned to you, you don't want to wait before you call the fire department until you see flames in your house. You'd rather, when you smell smoke, intervene. And that's what's happening here.

Jim Jirjis (08:56):

So what SPOT does, it's not robots from Hollywood, SPOT simply looks at the data real time and all the things that clinicians know are signs that a patient's getting septic. And unlike humans who every eight hours at shift chains do the assessment and fill out a form, you can't 24/7 be detecting this. The computer sits and does what it does well, it detects when the vital signs, the blood pressure, et cetera, when things are changing. And what's it do? It nudges a clinician and says, you might go look at this patient and do what you humans do better than we do, and assess and treat. And that's what we did. It's detecting real time and intervening. On average six hours before a human would have noticed the patient was getting sepsis, this system does.

Jim Jirjis (09:45):

And we've, after eight years of... It's really hard to actually change that 50% death rate with severe sepsis, if your loved one's in the hospital and they get to the point of severe sepsis, there's a 50-50 shot whether they make it. We were operating about 40%... I mean 60% survival. So we were doing pretty well, but we wanted to do better than that. Once we instituted this across the company, in 185 hospitals, we saw our mortality for the first time drop 25%. from 40% death rate, Chip, to 30%. And as Dr. Perlin so famously says, "How many people saw Christmas with their family because that algorithm was able to spread across HCA?" And that's the exciting thing for the country, Chip.

Chip Kahn (10:32):

That really is exciting, Jim. So where are you going next? What is HCA Healthcare looking at where it can use AI to make such a difference for patients?

Jim Jirjis (10:44):

Chip, if you look at where advanced analytics, AI, there's a tremendous opportunity to improve operations. For example, efficiency in the ER. So it's not just about detecting disease and when a clinician needs to see them. But if you're in any of our markets, you'll notice that we have billboards that talk about what the ER wait time is four minutes, seven minutes. We're proud of that because we put a lot of effort when you're sick and need to go to the ER, you don't want to wait 35 minutes. And so there's a lot of effort ACA to make sure that the throughput in the ER takes care of patients when they're needed.

Jim Jirjis (11:19):

One of the things these analytics has done is look at trying to predict when there will be surges in demand and make sure our staffing is appropriate for that so that when your loved one comes in next you don't happen to come in at a bad luck time where you're waiting an hour to get care. So that's an example of where analytics can be used to.

Jim Jirjis (11:38):

Also, for example, across the country, not just at HCA, a problem out there is when people get a chest X-Ray or CAT scan for some reason or another, and in the report incidentally might be a nodule, and what we're trying to do is use this to use natural language processing to look at all those reports and detect any nodule that somebody may not have followed up on and make sure that patient gets care earlier. Wouldn't you rather have a loved one be called and seen earlier and followup, detect a lung cancer earlier and survive because an algorithm was out there making sure nothing was missed anywhere?

Jim Jirjis (12:16):

It's not just an HCA problem. Across the country, these followups of nodules are a major effort. So I say all this Chip to say that wherever there's a problem where we want to improve outcomes for patients, whether that be access or detecting things earlier for intervention, that's where we're aiming this. And there's a variety of different projects that are looking at opportunities for that.

Chip Kahn (12:38):

Jim, how does this technology go from the big data, from all of your data on blood gases or your data from imaging, to be used by caregivers at the bedside? Meaning, how are they using the information you are given to actually get to the doctor, get to the nurse and make the kind of difference that you're describing like you did with sepsis?

Jim Jirjis (13:03):

That's a great question. There's two parts to this. One is getting the data, and we'll talk I think in a bit about what's happening with interoperability, hitting the data in a state where you can actually do these analytics and actually determine what I call the signal, the nudge. What do you do with the nudge? It's like a football game, sometimes you make a pass, sometimes you run the play. And I'll give you a couple of examples. A signal doesn't do anything unless it's handed to the right person at the right time to act. So we have put in place a set of scalable tools that take a signal when we in one hospital figure out how to make an intervention and get that to someone and we demonstrate we can improve care, to rapidly get that out to all of our hospitals. It's something called Raven. It's a communication system.

Jim Jirjis (13:50):

But let me tell you a story. One day, about a year ago, year and a half ago, I gave a talk saying, "If any of you have a signal that you want to get at that time, secure message to a clinician or a manager or something, we're ready to do that, but we need ideas for how to improve care." This doctor came up to me, he was in new CMO for one of our divisions, Sebastian Strong, and he said, "I have an idea." He said, "I just came into this role ... " And when you're taking care of a stroke patient Chip, it's like a heart attack. If you come in, can't speak, your left arm isn't working, the longer you wait before you break up that clot that's causing a block in the blood flow to the brain, the longer you wait, the more likely you'll die or be paralyzed the rest of your life. So nationally there's this impetus to when a patient hits the ER, within an hour, do all the CAT scans, anything you need, but within an hour have that clot-buster medicine going in your vein to dissolve the clot so that you have less chance of dying or being paralyzed.

Jim Jirjis (14:54):

And [inaudible 00:14:55] we measure how we do because we're always wanting to do better. We're doing really well in that area. But with our competitive nature, this doctor said, "I'm last in the

company." So a patient that went to one of his hospitals had a greater chance of either dying or being paralyzed than elsewhere. He wasn't satisfied. So his idea was real time, let's have the computer detect when the patient came to the ER, hit the ER, and when that clot-buster medicine was actually dripping in their vein, we have that, and then immediately calculate whether they were on target with the time or not. And if they were, given them an [Addagril 00:00:15:30]. and if they weren't, say you didn't meet the time, do an assessment as why we're going to be talking to you tomorrow so we can change the system to do better. That's a simple intervention, Chip. And what happened was, in his division, he went in three months from last in the company to number two in the company and has sustained it.

Jim Jirjis (15:53):

That's not the best part of the story. The best part of the story is because we had these systems in place to rapidly scale it, that post office I said, that communication tool, leaders of our company said, "We'd like you to scale that to all 185 hospitals by the end of the year," and we did. And now it's in 185 hospitals. Well, let's do the math on that a minute. HCA, because of its size, delivers 5% of all acute hospital care in the US. That means one in 20 patients. And that means that an idea a doctor had earlier that year was spread so that one of every 20 stroke patients in the United States who comes in and gets the benefit of that intervention. It used to be a new idea took 18 years to actually permeate society. I think doing it in 11 months is pretty darn good. And I think that story tells the promise because it's not only the signal but it's figuring out how to actually deliver it at the right point and how to improve a process and then how do you scale it across the country. Very exciting,

Chip Kahn (16:59):

Jeff, that's really something that's both important and easy for everyone to understand, a simple use of both big data, the digital technology, and then the human beings being part of the process and improving. But anytime there is a revolution, in this case with AI and big data, there are always unintended consequences. Have you seen any of those and can you outline some that we should be aware of?

Jim Jirjis (17:31):

Yeah, I think an exciting problem to have is the noise signal ratio. So if I come up with a great signal that needs to go to a clinician, and then somebody else does and then a third person does well, it's really helpful to have someone smart around nudging you all the time, but if you're getting 60 an hour, then there's a limit to the human's capacity to actually process it. So one of the things that we are very mindful of is, is how many of these can a human get and how do we prioritize them? And there's precedent to this. If you look in our intensive care units, anyone who's looked there, one of the problems we have is the signal overload. If you walk in an intensive care unit, it sounds like a rainforest. There's machines that go bing, and they're all going bing, and there's just an overwhelming if... There's too many signals. So there's a lot of initiatives in the ICU to try to reduce that noise to signal ratio, same kind of thing you experience with the signal deliveries is you have to be very, very mindful and parsimonious so you don't exceed the human's capacity to handle it.

Jim Jirjis (18:36):

I think Sitting on the Dock of the Bay is one of my favorite songs by Otis Redding, and in there he has a line that says, "I can't do what 10 people tell me to do and so I remain the same." We don't want the staff and doctors to just ignore these important signals because there's too many of them.

Chip Kahn (18:53):

Along the same lines, the FDA has recently released a draft guidance defining exceptions to medical devices that might affect software and particularly, the algorithms that underlie the operation of our artificial intelligence. How do you think we should be, from a societal and from a regulatory standpoint, balancing the need to promote innovation while at the same time protecting patients and society through regulation?

Jim Jirjis (19:28):

There's a lot of dialogue about this right now Chip and I think it's fairly simple. There's a simple way to think about it and I think we talked about it earlier. When there is a computer algorithm that is automating, not only finding patterns but actually acting on those patterns, making the diagnosis and then doing some sort of order or scheduling surgery or whatever, that's automation. And that's very, very different than the nudge. And I think the promise of informatics and the promise of what's happening on the national scale with interoperability and the power of computing now is upon us, and that power is to take that data and iteratively hospitals, clinics, et cetera ... It's a very iterative process to figure out how to get that signal refined, but at the end of the day it's just a nudge.

Jim Jirjis (20:19):

And when something is simply finding a pattern and nudging someone who then, whether they be a doctor or a nurse, within the scope of their practice, using their training experience and knowledge, actually does their job. That's something we need to be very careful that we don't overregulate lest we destroy value in society by lengthening the time and increasing the cost of these innovations that are iterative. So from our standpoint, a computer system that actually nudges somebody that then does their job is very different than an automated process.

Chip Kahn (20:55):

You bring up interoperability, how does inoperability fit into all of this? I know different facilities use different terms for the same treatments or conditions, so in terms of sharing information, how can we be sure that these algorithms, the use of these algorithms in AI is going to be effective if we're not completely confident that the data is all the same that all of this is built on?

Jim Jirjis (21:22):

Yeah, it's interesting. I like to use the analogy of the Tower of Babel, so if you look at every single hospital, the terminologies they use for cholesterol at one hospital, same lab test, go to the next hospital it has a slightly different terminology, go to the next one it's slightly different in their EMR. There are international organizations that have mapped all those to a common language. Without that mapping it's like the Tower of Babel. One hospital speaks French, the other Italian, the other right Spanish. And then when you put all the information together, no one knows how to get insights and how to use it.

Jim Jirjis (21:59):

So what's happening on a national scale that we support is this move to what we call the US CDI under TEFCA, and that's the Trusted Exchange Framework and Common Agreement, and what that's doing is making sure that the information follows the patient wherever they go so that the patients and clinicians have the information they need to safely care for patients, but also that it's to a common

language so that humans and machines can understand it and provide the same kind of decision support we do here.

Jim Jirjis (22:29):

Let me give you an example. Let's say someone comes to my clinic and at another clinic they had a body weight that was overweight, somewhere else they had depression diagnosed, yet another place they had high blood pressure, and then once when they're in an ER, someone documented that the wife said they snored. You see there's distributed information. Well, computers can process that and say, that patient might have sleep apnea. Sleep apnea is a condition that causes early death, congestive heart failure, depression, hypertension, but no one connects the dots. What we're talking about here is with inter-operability in the same language is that information flows when they come to my clinic, you can imagine a nudge. I'm trying to treat the patient's depression, nudge, "Hey, consider the possibility of sleep apnea." And instead of my just endlessly increasing antidepressants, I finally figured out that, "Oh, the real problem is sleep apnea. Why don't I, within my licensure, knowledge and experience, why don't I treat that and maybe they can come off antidepressants?"

Jim Jirjis (23:34):

That's a story, but what it tries to tell you is you can't do any of that when, A, none of these five places that patient went talk to each other and B, if they speak a different language. Is that helpful?

Chip Kahn (23:45):

That's great, Jim. And as we head to our closing here, let me ask this question, because you've been around health IT for a long time and seen technology's role in healthcare, expand and expand, what do you think the future holds for the kinds of innovation and progress in care we can potentially have from AI, big data, the use of this technologies?

Jim Jirjis (24:14):

Yeah, I think that you will see much more patient engagement. For example, patients being able to very easily, with a click of a button if that, have all of their clinical information in one place with these kinds of insights nudging the patient. You'll see patients entering data.

Jim Jirjis (24:36):

I think you'll see genomics. There's a lot happening to support how we understand human genomics and its impact on disease. And that would never be possible without these big data AI techniques to sift through all the genetic changes and then which ones are causative of a disease.

Jim Jirjis (24:52):

I think you'll find that the data, as it's liberated and prepared for use, that there will be all kinds of opportunity for healthcare providers and others to actually develop algorithms and interventions that improve outcomes and reduce cost to health care over time.

Jim Jirjis (25:09):

I think to quote my boss, Dr. Perlin, he provocatively asked the question, "What if the answer for how we improve care, how we avoid infant mortality, is already in the data. What if the answer's already there? We just have to use these tools to actually find it and improve care." That's really compelling. If

you look at one of the things HA did with its data that was published in The Green Journal some years ago, ACA delivered, at that time, about the same number of babies as the country of Australia. So the CDC and others came to HA and said, "Well, it used to be when I was in training that if you made it eight months, if you made it to ... " I guess 32 weeks, seven months that you could probably go ahead and induce. It was probably okay to induce labor. Well, you could take a couple of hospitals and take many years to answer the question of whether or not waiting matters.

Jim Jirjis (26:11):

But it turns out that we can answer it very quickly with all those deliveries. What we said is, are there more babies that go to the neonatal intensive care unit sick if you delivered at 32 weeks, 33 weeks, 34, 35, 36, 37? And it turns out there's a big difference, that the outcomes are far worse each week that you deliver early. So one of the things we did is we stopped those practices unless the mother or baby was at risk and we did not have just elective inductions. That was published in The Green Journal and ended up being changing care across the US and the world. And that's a great example of the answer was already in the data. We just had to look.

Chip Kahn (26:50):

Thanks so much Jim for speaking with us today. This has been a truly fascinating conversation. And I just look forward to the next discovery that will come from, as you're sort of pointing out, what's right in front of us, that big data.

Chip Kahn (27:07):

Join us next time as we speak with experienced leaders on new ideas about healthcare delivery and financing. Please listen, rate, and subscribe wherever you get your podcasts. And if you haven't already, you can follow the Federation on social media @FAHhospitals and me, @ChipKahn. This was Hospitals in Focus. I'm Chip Kahn. Thanks again for listening.