**Precision Medicine Podcast, Season 3, Episode 43**

**AbbVie’s Christopher Boone Integrates Real-World Data with Precision Medicine for Better Patient Outcomes**

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Karan Cushman:  
Welcome to season three of the Precision Medicine Podcast sponsored by Trapelo. This is the podcast where experts come to discuss the problems oncologists, reference labs, and payers face as precision medicine grows and consider solutions for advancing the quality of patient-centered cancer care. Be sure to subscribe at precisionmedicinepodcast.com to get the latest episodes delivered straight to your inbox.

Jerome Madison:   
Welcome to another episode of the Precision Medicine Podcast. I'm Jerome Madison, and today we have Christopher Boone, Vice President and Global Head of Health Economics & Outcomes Research at AbbVie. Christopher, thank you for joining us on the podcast.

Christopher Boone:

No, thank you, sir. Thank you for having me.

Jerome Madison:

Chris, I've heard you speak a few times, very talented and entertaining speaker if I would say, which is not common at some medical conferences. But if you don't mind, tell us about your background in the journey to your current position at AbbVie.

Christopher Boone:

Oh, yeah. Sure, man. I think the first thing we should know that is I am a native Dallas, Texan as I like to disclose to people. Can you hear me okay?

Jerome Madison:

Oh, yeah.

Christopher Boone:

Yeah. So native Dallasite, if you will. Grew up in the city of Dallas and actually was one of the few folks who lived there, but actually moved back to the city where you're from. You know you got a lot of people in Dallas that are not necessarily from there. But it was there that I then went to the University of Tulsa. And at the University of Tulsa I kind of came to this epiphany, after having done a number of internships in the oil and gas and energy industries, that it wasn't for me. I know that it was the predominant industry in that particular region of the country, but I just found no fulfillment in it at all.

Christopher Boone:

I remember having a conversation with one of my advisors in college who asked me to pursue this idea of hospital administration and healthcare. And when I looked into it, I didn't know much about it honestly. I didn't know that that was a viable career path to be totally honest. I thought, wait, if you were in healthcare, you were some sort of clinician or provider and that was generally the extent of what you did. But after around my sophomore year, as I had started doing more and more research into it, I found I was like, "This is perfect." I knew I wanted to be a CEO. I knew I wanted to help people. So I committed myself to ultimately pursuing this path of being a CEO of what I felt was a public hospital that would essentially service the needs of folks in underserved areas. So in my case, and in Dallas, that would have been a hospital like Parkland Hospital.

Christopher Boone:

So, after I graduated, I actually came back to Dallas, started pursuing healthcare related jobs. I actually ended up getting an opportunity to work with the University of Texas Southwestern Medical Center, which was technically my first healthcare job. I was there doing some much more like IT technical support. They had a number of systems in there. And it's interesting because at that time, literally this was in 2002, 2003 timeframe, there wasn't the prevalence of electronic health record systems that it is now, so, you kind of fast forward, and you think it's crazy.

Christopher Boone:

But at that time they were still very much like... I don't know if you remember Microsoft Access. I would say the equivalent of Microsoft Access-like databases being run in many of these hospitals. So, when we say we were doing support on many of these information systems, they were very rudimentary. And so anyway, so I was there then I actually end up being recruited over to Texas Health Resources, which is obviously a large, integrated delivery system there. And they were getting ready to launch this initiative or this electronic health record system with this small company at the time called Epic. It's funny when you fast forward now you're like, "That company used to be a tiny company then."

Christopher Boone:

So, I had a great opportunity to be exposed to a number of different transformational initiatives around informatics in the hospital. And I think really that's where it all really started for me. If you fast forward up to my career, through my career, then you get to the point where I started to work at the American Heart Association. That was my pivot into the area of clinical research use, basically the secondary use of data that we were capturing in many of these electronic systems. And so that's where we were starting to get into the world of real-world data and real evidence before we were even calling it that. It was just really the secondary use of data that we were capturing.

Christopher Boone:

You fast forward, and I had the great fortune of working at a great firm in D.C. by the name of Avalere, then I went and had an opportunity to lead a public private partnership called the Health Data Consortium, which was affiliated with the Obama administration's efforts of healthcare reform and health innovation. Then was recruited away to work at Pfizer to essentially expand their initiatives around real-world data and analytics. I then had another great opportunity to really establish an organization called Global Medical Epidemiology & Big Data Analysis at Pfizer as part of that, too.

Christopher Boone:

I just think I couldn't have scripted my career any better than it's just organically filled out, and I always think it's great because people ask me all the time, "How did you get to where you were and did you map that out?" And I was like, "Honestly, my career aspiration when I started was to be a CEO of a public hospital." I don't think I could have scripted this any better than what it's worked out. And in many ways I'm grateful for it because I can see the impact that I make, and you go from there.

Jerome Madison:

Yeah. We hear the term real-world evidence, more and more industry uses it, physicians use it. Before then it was just, you hear the term Big Data kind of as a blanket term. Can you clarify for us, like just what is real-world evidence and how can it help us expand the practice of precision medicine?

Christopher Boone:

Yeah. I mean, I think that you'll oftentimes you'll hear the terms real-world data and real-world evidence used interchangeably. They're not the same. The real-world data, I would more equate to being like the raw data that you're capturing from electronic health records, patient registries, insurance claims, data, pharmacy records, even social media data. I mean, and now, which is the big thing as we talk about social determinants, it's environmental data. So, it's really all the data that you capture outside of a randomized clinical trial that would tell you about the experience of the patient. It's important because for the longest time we just relied solely on a randomized clinical trial evidence to really tell us around the SEF, the safety and efficacy of a drug or a therapy in a real-world context.

Christopher Boone:

And keep in mind, real-world evidence itself is not just limited to drug therapies. You have medical devices, you have other interventions that are being conducted. What real-world data is simply saying is that, I want to understand how this works in a real-world context that's not a controlled environment. When you think of randomized clinical trials, you think of a homogenous population who usually had to meet certain inclusion and exclusion criteria to even qualify to be part of the clinical trial. So it's intentionally controlled and that's really to see if there's a substance of effect of whatever intervention on the patient and their health condition.

Christopher Boone:

Again, when you think about real-world data, what you're really saying is that the world is really not controlled. The human population is not that homogenous. You have people that deal with co-morbid conditions. You have folks that live in certain environments, others who don't, certain people that have access to care, others who don't. You still have folks that fit a certain genetic profile. You have a number of factors that contribute to the overall health condition of an individual. And that real-world data is telling us, "Tell us about those people and tell us about how effective is this intervention or how effective is this therapy in that real-world context?" That's the shift that the world has taken as we start getting more into this whole value-based healthcare system that everyone seems to be particularly enamored with.

Christopher Boone:

And now, what precision medicine says is that it's an acknowledgement that the world is different and you and I are a different genetic makeups, and we live in different environments, blah, blah, blah. It's saying that, "How do I personalize that medicine and tailor it to you, and to ensure that you have a more positive response to the therapies that you're being treated with." And so, if you think about it, I think that a world like oncology, for example, where the patients are all very different, you can utilize that real-world data to improve the clinical outcomes for many of those patients. And that's really where the integration of those two really starts to take shape.

Christopher Boone:

If you think about areas where I think folks are looking at real-world evidence as being somewhat kind of the solution for all situations. And as an advocate for it, I would never say that. But I think in certain situations, as you start to get into many of the rare diseases that are out there, and there's a gazillion of them out there, and then you start to get into many of the oncological conditions, you recognize quickly that RWE can tell you a lot about the patient and the patient experience and how we can adjust the treatment protocols to improve their clinical outcomes. And that's really what we're trying to do.

Jerome Madison:

So what areas of healthcare do you anticipate this making the most immediate impact on? Here on the podcast, we tend to focus a lot of the conversation on precision medicines role in cancer care, but we know that precision medicine and obviously the real-world evidence is expanding in many different disease states.

Christopher Boone:

Yeah. Now, I think that cancer is certainly one of them. And, man, even if you just focused on the issue of cancer alone, it would be huge. I mean, I would be remiss if I didn't acknowledge the fact that I actually just lost a very dear family member, my aunt, to cancer on Monday night. And it's tough when you experience these things directly, and it's a reminder of why we do what we do. But I definitely think in cancer and all the different tumor types that are out there and all the different cancers that are out there, you can make an incredible impact on patient lives.

Christopher Boone:

But I think that people should fully understand that the idea in the notion of a real-world evidence is not as novel as we think. I don't think we've used the term... I mean, it's a bit buzz-wordy nowadays, but we, we've been focused on the secondary use of much of these clinical data for a long time. I mean, I think about in cardiovascular care, the idea of building patient registries to improve many of the clinical practice guidelines and protocols has been around for at least a few decades now at this point. So in that case, it wouldn't necessarily be new.

Christopher Boone:

I think that you saw this increasing use of real-word evidence over the last five years or so, and people are more and more using it. So, it's like the new form of Big Data, I think in some regards. But I do think that it has general applicability to other therapeutic areas as well. I don't think it's necessarily limited, because remember what you're really trying to solve for is better understanding the real-world performance of an intervention or a therapy and the real-world experience of a patient. That's consistent across the entire healthcare system.

Christopher Boone:

I mean, it's not just limited to oncology, it's not just limited to the topic of precision medicine. And then, when you think about this idea of precision medicine, what makes it actually viable at this point or a number of factors converging. We've had over the last decade, you've seen the exponential growth of cloud computing, for example. So, we don't have the storage issues we use to have. You see the exponential growth of computing processing power and analytical capabilities now. And even the increasing adoption of many of these advanced analytical capabilities that we see through the forms of AI and NLP and all these other things that essentially I think enable the better use of precision medicine.

Christopher Boone:

I remember when precision medicine we were just calling it personalized medicine, and it was taken a different tone, and then we obviously pivoted, and now we're calling it precision medicine, which is fine. But the reality is that, it's not what you call it that makes it more effective, it's all of the enablers that contribute to it, and a lot of it is technological.

Christopher Boone:

So, from my vantage point, I think this explosion of data and data sources that we have now that we'd never had before, from everything from wearable technologies to adjustables that are seemingly becoming more interesting to the idea of even just the patient-generated health data that we get in a passive way, in a passive manner, I think are all contributing to an ability to be much more precise in how we think about precision medicine. I think it's funny because I mean, from my vantage point, you can attach precision to literally everything. You can say precision medicine, you can say precision marketing, you can say precision supply chain. I mean, you can apply it. It's about the ability to make much more evidence-based decisions in whatever context you want to apply it to.

Jerome Madison:

Yeah. The focus for you and your team at AbbVie is looking at health economics and outcomes research, what are some examples or some ways to leverage real-world evidence to improve patient outcomes or reduce the cost of cancer care?

Christopher Boone:

Yeah. Now I think that's great. I mean, when you think about our group, you can think about a number of key activities that we engage in that would assist in that. I think first thing is that historically most HuR functions or HuR functions are primarily focused on justifying the economics of therapies. And you do that under the context of, what's the current standard of care and how is this making it better? So the value question is really what you get into.

Christopher Boone:

Then one of the key questions that we always get from many other providers is, okay, if I were to prescribe this medication, what would be the impact of it to the patient? Because there are certain situations where there are therapies that are already on market for a particular clinical conditions. And so you really got to say, "Is this therapy, is it going to generate better clinical outcomes? Is it cheaper? Is it less intrusive?" Like when you shift from intravenous administration to just oral therapies, you know what I mean? Is it... Then also I think in the case of where there are new diseases or new disease types, we can always use real-world evidence to better characterize those diseases and better understand those diseases. I think one of the key examples I would give is that, when it comes to the drug Viagra, I don't think that people thought ED was erectile frontal side.

Jerome Madison:

It was an actual thing.

Christopher Boone:

Right. It was an actual disease. Yeah. Right. That's what I mean. So, it's kind of like you use real-world evidence to better understand and honestly do a bit of hypothesis generation around potential new diseases that we don't fully understand. I was actually reading something the other day, Jerome, where they were talking about the anticipation of new diseases due to technology. And I was like, "Man, what does that mean due to technology?" And then, so I'm reading the article and it's talking about, because now more and more folks are using these virtual reality devices, and many of them are playing these kinds of first-person shooter games, like the Call of Duty type of games of the world, and the potential for them to engage and now suffer for some form of PTSD as a result of it. So, now they're going to be coming up with a new disease, believe it or not, that says that regular civilians could actually suffer from PTSD due to these virtual reality games and engaging in these games for extended periods of time.

Christopher Boone:

I mean, so these are different situations where real-world evidence actually applies. Now when you think about oncology specifically, what we're getting into is a world where we can be much more precise if we're going to stick to precision medicine, and better understanding that individual patient, but also understanding more about the disease than we ever knew. I think one of the greatest innovations or advances we've seen in medicine is the ability to do the whole cocktail approach to certain therapies. Maybe we saw the other day that the president was at Walter Reed and they were like, "Well, how are you treating this person?" And they were like, "Well, we're using a cocktail approach to increase the number of antibodies that he has so that hopefully that he can get through this period of COVID much quicker than the others have." And so, I think that's a very personalized approach to him. I don't know what they know about his health condition that we don't know, and obviously I shouldn't know, but the idea of being personalized in that approach to the individual is what we're trying really do.

Jerome Madison:

The Precision Medicine Podcast will continue right after this.

Karan Cushman:

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Jerome Madison:

When it comes precision medicine as it pertains to its use in oncology, it’s largely dependent upon biomarker testing, because the biomarkers identifying which patients are likely candidates for drugs or deselecting candidates or therapies based on their biomarker expression is, we believe, key to unlocking the potential of precision medicine. As it pertains to real-world evidence, what are some other barriers that you see that are kind of standing in the way of the progress or the rapid expansion of leveraging this information?

Christopher Boone:

Yeah. I mean, I think there has been increasingly interest in biomarker identification and development with the use of RWE in many respects, because if you think about it... If you think about the use of RWE in the context of what we know in our traditional way of conducting a randomized clinical trials, what you're looking for is a better understanding of the disease or to contextualize the disease itself and what we know about it. I mean, and then you want to understand the characteristics of the patients and the types of patients who are most affected by these diseases. And then you start to get into, and many of our friends in clinical discovery, what type of biomarker development can we glean from the sort of data and analysis? And so you very much view it like a feedback loop.

Christopher Boone:

Now the issue is, when it comes to real-world evidence, as you start to get into clinical discovery and clinical development is that, if the goal is to better understand performance of a drug in a real-world context, if the drug is not on the market then you can't fully understand its performance because it's just not there. So, it's like there's a data availability challenge. But what we can get into is a world where we understand the disease. So, if you're focused on drug performance, then that's one thing. But if you're focused on disease contextualization, and characterization, then that's a different issue. And we can use many of our data sources to better understand that.

Christopher Boone:

And so, when I think about the potential for the use of RWE, well, I'm going to argue as much more upstream, then I think that it's really the biggest role that it can play is in this idea of contextualizing and characterizing a disease in a much more novel way than we've ever done before. Because now you have this rich historical database of all of these patients over the years that you can look back and you, and we may not have understood using that ED example for example, ED before, but now we know what it is and now we can look back 50 years and say, "Wow, these patients were exhibiting symptoms of this disease that we didn't even know they were exhibiting before."

Christopher Boone:

That's one of the big, I think, advantages of the use of it. It's just we now have this rich repository of data on patients and certain disease types, and we may not have fully understood what those diseases are because they, it wasn't designated a disease. But now we can actually look back and see the symptoms and even get some form of a longitudinal perspective on that patient over many years to see what sort of response they had to certain drugs or if their health situation improved at all.

Jerome Madison:

You mentioned Artificial Intelligence, and I've heard you speak on that. Can an automated system or technology solution help us increase clinical trial accrual while lowering the cost to acquire a patient into clinical trials?

Christopher Boone:

Yes. I guess simply put. I mean, I think the reality is that we are at a place where we're generating so much data. I mean, it's unbelievable. And one of the stats that I saw within the last couple of years is that we were generating this exponential amount of data but we were only analyzing less than 5% of it. It's not a matter of if we should use AI, it's a matter of how. Because I don't think that we can analyze the data at the pace at which we generated in order to really get those insights. And so when it comes to something sort of... If we're using the idea around, and this is actually one of the greatest benefits of real-world evidence, is the ability to identify patients and identify where they are.

Christopher Boone:

You almost can't rely on human intervention or human analysis to be able to comb through all of that data and be able to make a clear determination as if they are best fit to participate in this trial, or even if they're in the trial, fully understanding what their clinical outcomes were and if certain end points were met and so on and so forth. But I think when it comes to the idea around AI, I almost feel like we're thinking about it wrong, we're approaching it wrong, because we are approaching it as if it's an either/or when it comes to human involvement and the use of AI.

Jerome Madison:

Good point.

Christopher Boone:

I'm not going to go off and say that... The AI itself is only as good as the data quality or the data source that it's deriving the data from. One of the things that we've been particularly focused on, and I was at a pleasure of talking to two of our leads here at AbbVie, one of which leads our precision medicine expansion efforts, the other leads our genomics initiatives. And one common thing that they both told me directly was around the need for the... obviously the need for more data, but not just any data— quality data, quality observational data that they can use. Because really the models are only as good as the data sources that they are building the models from.

Christopher Boone:

And as we move into this period of automation as much as we can, I think that it's always going to come down to data accessibility and data quality. And I think it’s particularly interesting that we... When you think about organizations, especially pharma companies and their attempts at AI, we're approaching it in a way that, "Oh, I've invested in this AI, therefore I should be able to cut costs everywhere else."

Christopher Boone:

I think that just by the virtue of being able to better identify patients and where they are and improve our recruiting efforts, that would lower the cost of a per-patient cost per trial. So, the operating cost I think is inevitable and will be addressed just by technology, but I don't even think you need AI for that. I just think you need better insights into the locations of where the patients are and that's really what a lot of real-world evidence gets us. But I think AI gets you a greater advantage in its ability to do things in a faster and cheaper way just by the mere fact of speed to analysis. And so that's one of the key things that I think that we have to think about is this idea of how are we're effectively utilizing AI and in what situations.

Christopher Boone:

I know that there's been a number of attempts over the years to deploy AI in a clinical discovery and clinical development context. One of which was the idea of being able to siphon through all the literature globally in record time. Because in a lot of the things you're doing now, you hire epidemiologists, they're reviewing many of these articles and they're trying to be as efficient as they can, but the reality is if you had some AI capabilities, you could probably comb through much of that literature at a much faster rate, and honestly be much more accurate in what you extract from it. And that's really the claim to fame that I think technology such as Watson we're aiming to do.

Christopher Boone:

But I think there is still a role for a human intervention even when it comes to that because you still need folks that are going to go back and do the spot-checking, if you will. I know there are a number of tech companies in the oncology space, by the way, who are using AI to essentially do much of their analysis, and they can't rely solely on the AI as far as from a quality perspective. So what they do is they have a certain percentage of audit checks they use as part of the process. I don't know if the human intervention would ever be totally removed. I think you can lower the costs. I think you can lower the cost of trial recruitment for each individual, but it's not just recruitment, it's also retention, and that's a big thing too.

Jerome Madison:

Yeah. You mentioned one of your early passions is wanting to be a CEO for a public hospital. When you talk about diversity in healthcare administration or talent, there's not a large representation in many cases in the decision-makers. What effect do you think that has on the research?

Christopher Boone:

I think I'm on record saying more diversity equals better science. And the reality is that we can't understand the response of these therapists on these various subpopulations absent having their participation in the studies. I get that there are a number of reasons why certain groups aren't participatory in some of the clinical trials. I mean, if you think about it from the black community, there's a long history of why we as a people are much more reluctant to participate in clinical trials.

Christopher Boone:

But I tell folks all the time is that if we don't have that level of participation, because the reality is what we aim to do, and this goes back to your idea around precision medicine, is to better understand a person's genetics, their environment, their lifestyle, and ultimately how we can better improve how we essentially prevent and treat diseases. And so, if we don't get that level of participation then we're not doing our jobs as far as representing the general population in these studies and making sure that we're seeing the positive responses in all populations, not just one. It shouldn't just be white males who have historically been the more dominant participant in these studies.

Jerome Madison:

But in its approach to research, gives us a greater opportunity for more diverse study candidates to participate in the data.

Christopher Boone:

I do. I mean, you think about it. There was a recent study that was on multiple myeloma, and basically the article was stating that 20% of multiple myeloma patients are African-American for example. And the only way you know that is you know that's the real-world data. So 20% of the patient population who who've been diagnosed with multiple myeloma are African-American. But then they went back and they looked at the clinical trials for multiple myeloma, and they saw that less than 3% of the study participants were African-American. So you have a 20% prevalence rate, and you have less than 3% participation in clinical studies or clinical trials. That to me is problematic. Would you not say? I mean, I think that the advantage that real-world data gives us in these different situations is that we can better characterize, not just the disease, but the patient population, like who all has this disease, right?

Jerome Madison:

Yeah.

Christopher Boone:

And I'm not saying that it has to be directly proportional. So, you have 20% prevalence rate in African-Americans, therefore you need 20% in clinical trials. I mean, I know it may be a bit challenging in some regards, but what the real-world data also gives us, it tells us where are these patients? So then we can identify sites where we can actually engage these patients better and potentially recruit them into these clinical studies. But the thing that I'm very hopeful for honestly, and what's really come to play and what's really coming to bear in the course of this pandemic, is the idea of doing a virtual or decentralized trials. Well, does it matter as much where you are physically. We can leverage technology to ensure that we're getting the level of participation that we need from all patients and all people. And it does help with retention, too.

Jerome Madison:

This is truly fascinating stuff. For those who want to get in touch with you or to contact you for speaking opportunities, how can they get in touch to you? Are you on social media? How can they reach out?

Christopher Boone:

Yeah. Well, I'm on LinkedIn, and I'm on Twitter. You can find me on DataHippie, I'm on Twitter.

Jerome Madison:

DataHippie?

Christopher Boone:

Yeah. It's @DataHippie. And then even on LinkedIn, actually it's DataHippie there too. So you can find me. Yeah, I'm not cool enough to be on Instagram and all that stuff and [so… But I'm out there and if you definitely want to get in touch with me, please do.

Karan Cushman:

Chris, is it okay if we use that in our tittle for this episode?

Christopher Boone:

Yeah, of course.

Karan Cushman:

Just kidding.

Christopher Boone:

No, you can. I mean, it's absolutely fine. Yeah.

Jerome Madison:

Christopher Boone, Vice President Global Head of Health Economics & Outcomes Research for AbbVie. Chris, you got a couple of Texas -aised men on this podcast. So I have to ask you the real question that people want to know. Are you a Dallas Cowboys fan?

Christopher Boone:

Yeah. I'm a die-hard Dallas Cowboys fan, man. You can't help but be in my family. I don't know if I could say that with any immense amount of pride right now, but I'm hanging in there. I'm not a fair weather fan, man. You know the thing that's most disappointing though, is that the years that we expect to do well, we do horribly.

Jerome Madison:

They break your heart.

Christopher Boone:

And then the years that you're like, "Well, I'll be happy if we go 500, 8made, I'll be good." Because that's overachieving. Then all of a sudden, we were like 13 in 3 and I'm like, "Where did this..." You just never know how this whole thing will play out. And this year it's been very disappointing.

Jerome Madison:

To say the least. At least we have some big problems that we're both trying to solve to focus on and you're making a tremendous impact, not only here in the United States but globally. So, thank you for being a guest on the Precision Medicine Podcast.

Christopher Boone:

Oh, thank you. Thank you for the opportunity.

Karan Cushman:

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**About Our Guest**

**Christopher Boone, PhD**Vice President, Global Head of Health Economics and Outcomes Research at AbbVie

Christopher Boone, PhD has a career-long history as a dynamic, innovative thought leader and a public voice on the power of real-world evidence, health informatics, and big data analytics and its ability to radically transform the global health care system into a learning health system.

Chris is VP, Global Head of Health Economics and Outcomes Research at Abbvie. He is also an adjunct assistant professor of health administration at the New York University's Robert F. Wagner Graduate School of Public Service, an active board member of several influential organizations, and a co-founder of a few start-up companies. Most recently, he served as the vice president and head of global medical epidemiology and big data analysis at Pfizer.

Chris has been recognized as a 2019 Top 100 Innovator in Data & Analytics, a 2018 Emerging Pharma Leader by Pharmaceutical Executive, and a 2017 Top 40 Under 40 Leader in Minority Health by the National Minority Quality Forum (NMQF).

Chris earned a BS from the University of Tulsa, a MHA from the University of Texas at Arlington, a PhD from the University of Texas at Dallas, and two executive certificates from the Harvard Kennedy School. He is a Fellow of the American College of Health Executives and a Fellow of the Healthcare Information Management & Systems Society.