

The Promises of Artificial Intelligence in Medicine

Transcript

Dr. Clancy

Welcome to Rounding@IOWA, a continuing medical education podcast developed by and for healthcare teams. I'm your host, Dr. Gerry Clancy, Professor of Psychiatry and Emergency Medicine and Senior Associate Dean for External Affairs here at the University of Iowa's Carver College of Medicine. Today we will discuss the promises and maybe some pitfalls of artificial intelligence in medicine. Our objectives today include, first, we hope our participants will be able to discern the different types of artificial intelligence that are being used and will be used in medicine. Second, we want our participants to identify where, when, and how artificial intelligence can be used in medicine. And third, we want our participants to acknowledge the limitations of artificial intelligence and possible harms from AI. Satya Nadella, Chief Executive Officer at Microsoft, was quoted as saying, AI is perhaps the most transformative technology of our time, and healthcare is perhaps AI's most pressing application. A Google Health Post stated, we think AI is poised to transform medicine, delivering new assistive technologies that empower doctors to serve patients better. Machine learning has dozens of possible application areas, but healthcare stands out as a remarkable opportunity to benefit people. Today, we are most fortunate to have an expert on all of this. Our guest is Dr. Jason Misurac, a Clinical Associate Professor of Pediatrics in the Division of Nephrology, Dialysis, and Transplant Care. Dr. Misurac earned his MD degree at Indiana University. He then completed pediatric residency and pediatric renal fellowship training at Riley Hospital for Children in Indianapolis as part of the Indiana University. He did not quit there and has received additional training in the Advanced Training Program in Quality Improvement from Intermountain Healthcare; in the American Medical Informatics Association 10x10 Training through Oregon Health & Science University; and certification in Clinical Informatics by the American Board of Preventive Medicine. He has published on a broad array of subjects, including artificial intelligence to improve patient outcomes and clinician burnout. He currently guest hosts the Kidney Chronicles, a pediatric nephrology podcast. When he was a resident at Indiana, he produced and edited Kids HealthCast, a pediatric podcast for time-deprived parents. Dr. Misurac, welcome to Rounding@IOWA.

Dr. Misurac

Thanks, Dr. Clancy. Delighted to be here and excited about our conversation today.

Dr. Clancy

Great. Well, again, thank you for joining us and thank you for the work you do. I just provided our listeners your official title and a summary of all your training. Could you give us a better idea of your daily efforts and what a work week might look like for you? I'm sure it is quite varied.

Dr. Misurac

Varied is the key word here. So it really depends a lot on whether I'm covering the inpatient service for our pediatric nephrology team or I'm not. And that's the biggest differentiator for me. On inpatient service, I'm rounding every day and I'll get calls in the evening. But on outpatient weeks, I have a fair mix between clinics and office time where I can do some of my work in informatics, which typically involves a lot of meetings, as I'm sure you're aware of all the administrative tasks that go behind bringing forward new things in medicine.

Dr. Clancy

How'd you find your way to informatics?

Dr. Misurac

You kind of hit it a little bit in my list of training. I initially thought quality improvement was going to be where I landed in terms of an avocation or sort of a secondary component of my career. The reasoning there was that oftentimes we have the information. We know what we should be doing to take care of our patients better. And whether that's something as simple as beta blockers after a myocardial infarction or more complicated like bundles to prevent CLABSI, you know, central line infections, I thought boy, this is the low-hanging fruit in medicine. This is where we should be focusing a lot more time and effort than we do. But sort of it happened a little bit by accident. I'd always had an interest in computers and tech, even to the point of in high school having built a web page when web pages were still kind of a new thing. And then, you know, the post became available for Associate Chief Health Information Officer here focused on pediatrics. And after thinking about it, I accepted. And from there, it's really taken off for me.

Dr. Clancy

Yeah, And I think the pace, as you said, will increase as well. You described it as, what was, how did you describe the advances?

Dr. Misurac

Yeah, it's like we're in dog years right now. So we're not taking small steps forward, we're taking leaps forward.

Dr. Clancy

Yeah, very much so. Before we get to the basics of AI, any thoughts on the quotes I provided earlier on predictions of AI, particularly in medicine?

Dr. Misurac

I think, as I reflect on some of the big picture, large direction, I think those are directionally correct in terms of the promise of AI in medicine. But I think it might be a little bit like the promise of genetics or genomics in medicine where, you know, we see the potential before we see the outcome. And I think some challenges are there in terms of how do we integrate these technologies into our existing workflows to make this work on a day-to-day basis. These tools, everyone can see how they could be applied, but applying them correctly and safely, avoiding bias, and also just making sure they're a reasonable part of our daily work, that they don't add more work for clinicians, I think are some of the challenges that we face in making those dreams a reality.

Dr. Clancy

Great, great. Well, your attention, and we'll talk about this later, on the impact of our work on clinician burnout is, we'll come around to that as well. And I think you've got some good advice on that as well. Our topic today is huge, something we could talk for hours on, artificial intelligence in medicine. Let's start with the very basics. How would you define artificial intelligence?

Dr. Misurac

Artificial intelligence at its core, it's using computers to imitate human cognitive abilities, such as learning or problem solving. So that's probably the most basic definition of artificial intelligence.

Dr. Clancy

And at the most basic level, how does artificial intelligence work? What do the algorithms actually do?

Dr. Misurac

Right, and so what these algorithms are doing is they are taking a large amount of data, they're collecting the data to learn, whether that's from sources on the internet, which has provided a huge amount of data for some of the large language models that we know about, or whether it's electronic health records, medical images, lab results, research publications. So you collect all that data, and then the data has to be organized, formatted, and cleaned to make it suitable for analysis. Oftentimes, you're sort of tagging within the data, what happened next so that the system can say, okay, when we start with this input,

here's the outcome. And then depending on the task, there's different algorithms that get applied to it. So machine learning, deep learning, different examples of ways where that happens.

Dr. Clancy

Well, I used this term earlier. How does machine learning kind of become part of artificial intelligence?

Dr. Misurac

So machine learning, it's a subset of artificial intelligence, allowing systems to learn from data and improving over time. So whereas traditional programming, you've got to program the exact things that the computer does, machine learning models are trained on data and then they can recognize patterns, make predictions, or classify new information based on what they've learned before.

Dr. Clancy

Great. So maybe an example is that my iPhone seems to get to know me better and better.

Dr. Misurac

Right. Or some other examples that you might recognize from your daily life would be your Spotify or your Netflix playlists, which those are picking up on the things you have liked before and trying to predict what you might like next.

Dr. Clancy

Absolutely. And I try to fool them all the time by getting very broad and eclectic as far as music. That's part of me playing with machine learning.

Dr. Misurac

Right. You don't want to get pigeonholed and just get the same sound in your playlist again and again.

Dr. Clancy

Great. So let's talk about the different types of AI. Could you explain and give us some examples of predictive AI?

Dr. Misurac

Right. So predictive AI, we were actually kind of just talking about that a little bit. Predictive AI uses historical data to forecast future events. So in medicine, for example, these could be used to predict readmission risks, to predict a disease onset based on risk factors. But some of the everyday examples you might come across would be weather forecasting,

where we can use past weather data to predict future conditions. or stock market analysis, computer behavior prediction. All of these are examples of predictive AI.

Dr. Clancy

You know, you're involved in dialysis and nephrology and transplant care. Is there a path for predictive AI within the transplant field as well?

Dr. Misurac

I think so. I think as we think about the transplant field, one of the biggest questions is who's going to experience rejection of that transplant? So we know that to prevent rejection, a patient needs to adhere closely to their immunosuppressive meds. So if we know which patients are at highest risk for that, then we can really loop back to the primary prevention and try to see what can be done to prevent that from happening in the first place. So that's, I think, one area that within transplant and dialysis would be a huge place for it.

Dr. Clancy

Great. And again, I'm a novice on this, but could you give us kind of the difference between predictive AI and generative AI?

Dr. Misurac

Right. So predictive AI, again, we're using historical data to forecast a future event. So this is given a set of labs, what's the chance you're going to develop acute kidney injury? Whereas generative AI is creating new content based on training data. For example, like ChatGPT, which will generate text output given a certain input or a question. Image creation like Midjourney, where you describe what image you want to see, and it puts out a photorealistic image—which has its own set of ethical concerns and questions—or even clinical documentation via ambient AI, which I know we'll be talking about a little bit later. But this is the concept that we can utilize ambient data or just data that's occurring anyway, and the system can listen in and create some of the clinical documentation that we would otherwise have to generate ourselves.

Dr. Clancy

Great. You've been so successful at getting a psychiatrist to understand this. So well done, Jason. You know, this seems like the year that AI just exploded onto the scene with medicine, at least here at the University of Iowa, but it's really not this year. How long would you say we've already been using AI in our daily lives?

Dr. Misurac

AI, you know, as we define it broadly, AI has been part of our lives for decades. In healthcare, this dates back to the 1950s, when we first started trying to use computers to guide our diagnoses. But I think of a famous moment in 1997 where IBM's Deep Blue beats Garry Kasparov at chess and all of the sort of consternation that arose about the singularity and people being replaced by machines. It's taken another quarter of a decade before we get to what feels like real AI. That's GPT, ChatGPT. But AI is integrated all throughout our lives. And even something as simple as our Netflix lists, but as meaningful as being applied to healthcare data.

Dr. Clancy

Yeah. You know, I've been, I don't know how long I've been using Google Maps, but every time I travel, you know, and I've got a rental car, I'll plug it in. And it seems very, very part of our lives now in methods like that.

Dr. Misurac

Integrated right in there. Every, every, it's hard to escape. Anytime you touch a computer or even have some sort of output from a computer, somewhere in there, some AI is part of it.

Dr. Clancy

Yeah. So let's move deeper into medicine and some of our problems in delivering care and how AI might help. One of our problems is so much medical knowledge is out there. Do you have a sense of how fast our medical knowledge base is expanding and what we're dealing with as far as information overload?

Dr. Misurac

So the medical knowledge base is certainly growing very quickly. And even I think in some ways, the growth could be described as exponential. It's widely quoted that the medical knowledge doubles every 73 days. I think that's a little misleading. What we're actually seeing, it's more of an exponential growth in medical data rather than a growth in actionable synthesized medical knowledge. So separating those concepts becomes important.

Dr. Clancy

Yeah.

Dr. Misurac

So the data is being generated at an incredible rate, whether we have the wearable devices, our electronic health records, genomics, all of this generates a huge pile of data. But that's

where artificial intelligence shows promise, because it can process and analyze these huge amounts of data, help us to find the patterns within it, and help in finding the right diagnoses and treatments.

Dr. Clancy

Yeah. just before we started, you sent me a link on Google's Notebook LM, and you know how you can take several articles and turn them into something simpler. Tell me your experiences with that.

Dr. Misurac

Yeah, so this is a new tool that just came to my attention recently, and that's a common theme. You know, new AI tool hops onto the scene and really starts catching people's attention. But this one, you feed it specific sources. So a lot of people, there's concern over like, where is the AI getting the information and is it explainable? Is it, can we really trust what's coming out? So with Notebook LM from Google, you are putting in specific sources and then you can either ask it individual questions or you can have it generate a back and forth podcast-like conversation. Watch your back because Google's coming for you.

Dr. Clancy

Yeah. So, you know, at the bedside, how might AI be helping us with all that information and getting to an accurate diagnosis and getting to a better treatment plan?

Dr. Misurac

So I think one of, there's a few different ways that this can happen, right? One is through some of the predictive models where the machine learning algorithms, the AI tools can take the data we already have within our electronic health record, and then from that, tell us who's going to develop sepsis or who's going to develop acute kidney injury and really help us—or stroke, right? And help us work on some of these primary prevention. So I think there's promise here in translating back to the primary prevention of a lot of these problems.

Dr. Clancy

Yeah.

Dr. Misurac

But the other way that AI is helping us in medicine is by addressing the cognitive workload that we as physicians have to do. So this falls into a couple categories, whether that's clinical documentation where the computer, the AI essentially writes your note for you just based on the natural conversation you have with the patient, or chart review tools or

cognitive AI for health where it takes the huge pile of disorganized and unstructured data, and from that generates structure and organization and presenting it to you in a way that you can quickly digest, understand, and you have a better understanding then of who your patient is and you feel more confident that you're not missing a key piece of information that would otherwise be buried deep within the chart.

Dr. Clancy

So, you know, being a physician that's been practicing more than 35 years, you know, I think I'm pretty accurate at being able to review a chart and pretty accurate at being able to understand what's going on. Is there any sense out there of accuracy of AI doing that versus accuracy of a seasoned clinician?

Dr. Misurac

I think that's a really good question, but I think it might not be the question I would ask. The question I'd ask is how much time it would take you. I think in the end, you're going to get the same result.

Dr. Clancy

Got it.

Dr. Misurac

Right? But I think where the benefit in AI, especially if the tool can organize the data in a way that fits your mental model. So that's important. But I think the benefit of the AI is helping you do that more quickly, more efficiently. And then also making sure you don't miss . . . So like our patient charts are, it's not just research that's growing really fast.

Dr. Clancy

Yeah.

Dr. Misurac

And the amount of data in every patient chart is exploding. So if you think about all of the healthcare information exchanges that we have now where the data is coming in from all these outside hospitals, if we think about the amount of testing that's being done now, the amount of notes that are generated for a given patient, we're getting to the point where, you or I as clinicians could get to the same eventual outcome if we dug through all the data, but there aren't enough hours in the day. And as this is not a problem that's going to get better, the volume of data in every individual average patient's chart is only going to increase over time. So I think we need tools that help us make sense of that and correlate it all more rapidly.

Dr. Clancy

Yeah. I had experience of this in Tulsa where we had four major distinct health systems, and then we had the VA, and then we had the Indian Health Systems, and then we had the federally qualified health centers. And on average, an individual had 17 different medical records across the town, between a private dermatologist's office and then something over at this hospital and then this hospital. Yeah, I see what you mean.

Dr. Misurac

And those are increasingly coming into our one medical record, fortunately, because we have the data there. Because before, it was really common that a study might be repeated just because it was done across town and we can't access the results, right? But just having all the data, especially if it's kind of in an unstructured way, which a lot of what we get is just, well, that continuity of care document, which is maybe 70 pages long, and you have to page all the way through it, and you're going to miss the part that's really relevant to you. So if you have a machine, a computer that can read it, tag it, find the key information, and surface that for you at the right time, that's where the value is.

Dr. Clancy

Yeah, that's great. We've talked for years that DNA analysis will be the lead in facilitating precision medicine where treatments are tailored to an individual's DNA type and do this with cancers already. We do it with some of the autoimmune disorders. But it looks like, you know, AI can come in as a wonderful companion to this. How might AI take precision medicine to the next level?

Dr. Misurac

So there's a lot of promise here because genetic data, that's again, if you think about a whole genome, a whole exome, or even just a limited panel of genes, that's a ton of data. And we rely on summaries because we could never comb through it all. So the AI can recognize patterns where we couldn't. Part of that is some of the simple things like predicting whether a certain genetic change is pathogenic or not. And this is only going to get better as these models do a better job of predicting gene function, protein folding, that kind of thing. But also identifying patterns and correlations that aren't just point changes in the genes, right, but that are patterns that we could never find by reviewing, that could lead to more precise treatments tailored to an individual's genetic makeup. Now, we talked about this before, that making that promise reality where that rubber hits the road, that's the challenge because, you know, we've had, we've thought, since the Human Genome Project, that just having the genome would be the key that unlocks everything. And it turns out that's not the key. That's, you need, you still need the keys to interpret all that huge amount of data. And so I think the analyzing, personalizing treatment, predicting all of

those things have wonderful implications and could really help a lot, but a lot of them are still kind of in the future.

Dr. Clancy

Yeah, I agree. And we really can't get to precision medicine via DNA until we have that assistance that you're talking about. So there's at least two keys. You need to know the code, and then you need to be able to actually know the code.

[laughter]

Dr. Misurac

Yes, the data versus knowledge, right? We talked about this before. The difference between information and actionable knowledge.

Dr. Clancy

Yeah. So you just mentioned kind of boots on the ground. Let's segue a little bit to some of the boots on the ground. How's it happening right now? And let's talk a little bit about physician time in the 1st place. You know, there's not enough doctors to do the work that's out there. So, I mean, and I work mostly in the emergency room and I'm in, I'm continuing to be impressed by how much time I'm in the emergency room sitting at my station and the other docs. Do you have a sense of percent of time our clinicians spend on the computer compared to being with the patients?

Dr. Misurac

Yeah, there was a great publication in the Annals of Internal Medicine by Sinsky et al. that they did a time motion study and followed around a few different specialties. Every hour of face-to-face time you spend delivering patient care, for every hour of that time, there's two hours on desk work, whether that's browsing through the electronic health record, writing notes, answering inbox messages. So the ratio of face-to-face time with patient to desk work is one to two.

Dr. Clancy

In my field of psychiatry, I mean, history is so important. What a patient can tell me versus what a chart can tell me over the years and the patterns, the chart review is so important. Tell me how AI is helping with that chart review and chart documentation time. And refer or get to also really what we're seeing as far as at least some improvements in improving time with patients.

Dr. Misurac

Right. So let's start with chart review. We talked about this already. If you can take this unorganized, scattered, disparate information and organize it in a way that fits your mental model, cognitive AI in healthcare, AI-based chart review, different terms for the same thing can really be powerful there. And that's one of the tools that we've implemented here at the University of Iowa, is a tool that does just that, which is integrated into our electronic health record and aims to organize the data in a way that fits the way we think of our patients, and it's integrating data from various different sources. So just like we talked about before, the raw information, the quantity of that is exploding, and having a tool that can make sense of that—hugely helpful. So there's chart review. Documentation, that's another area where AI can help. We introduced ambient AI earlier, where the AI is listening to the conversation between the clinician and patient, using the speech-to-text technology to capture that conversation, and then natural language processing and generative AI to understand, interpret, and output the things you already heard from the patient as history and the things you told the patient as the assessment and plan. So there's where documentation assistance comes from AI. The third one, which you hit on, which is actually really, really interesting, is the patient experience of all of this.

Dr. Clancy

Yeah.

Dr. Misurac

So we've had a few like just really glowing emails come across our way as people are using this. And one of my favorites was someone whose mother went in for care, an elderly mother who was just raving about the way her clinician was listening to her the whole visit, really taking the time to figure out and dig into what was happening. And she's like, oh yeah, and they were using some kind of computer to take notes during the visit. And so just this patient experience of like, if your clinician isn't focused on the computer, they can be more focused on you. Which I think is just from the way the patients are experiencing this, going to be also just a huge boost to restoring some of the things that we love about medicine. I say that no one got into medicine because they love typing.

Dr. Clancy

Yeah. Right.

Dr. Misurac

And so if we can take away some of those, frankly, clerical tasks and instead restore just that personal connection with our patients, boy, there's going to be benefits that are beyond simple time savings.

Dr. Clancy

Yeah, absolutely. And it, but it, at least from my experience, it does save some time. Do you have a range of what we're seeing as far as time?

Dr. Misurac

Really interesting when you dig into the data, because our electronic health record, there's a way to check in to see how much time a clinician is spending in the chart on various tasks. And what we see is a modest improvement, you know, maybe 30 to 60 minutes per week. When we see an inflection, that's the magnitude of it. But when we ask clinicians how much time they think they're saving, they're saying more like 3 hours. So I think that this disparity there is really interesting. And I think it goes into like the notes just being easier to write when you're starting with a draft rather than starting with a blank page. Right. not feeling this like, almost kind of like a fear or anxiety that you're going to forget key elements of the conversation because it's captured for you by the AI tool. And you can always refer back to that captured conversation to make sure you didn't miss anything.

Dr. Clancy

Yeah, that fits with my experience too, that when I come back to the electronic medical record after the interview, those are my words and those are the patient's words, you know, so it's not as if I've got a scribe that is interpreting, in that way, at least. It seems to be personal.

Dr. Misurac

Right, and it seems to be very true to the conversation you had with the patient on that day?

Dr. Clancy

Yeah.

Dr. Misurac

Without, and I think the other thing that's important with this kind of tool is the ability to customize it or template it the way you like, which that's, you know, different tools do this differently, but the ability for a surgeon who wants a very brief and targeted note or a psychiatrist who's going to want a lot more of that detail in their note, having the ability to have a similar length conversation go in, but a different output come out based on what the clinician needs for their documentation, I think that's really important.

Dr. Clancy

Yeah. And, you know, we've experienced lots and lots of training opportunities provided to the clinicians for that tailoring. That seems to be what you're trying to do for us with all. I mean, it's, it's almost every day we have an opportunity for training, right.

Dr. Misurac

Yeah, so we're really focusing on that component of it is, and I think that's the key to get people to use this more, is that the note has to come out in a way that's useful to them, right?

Dr. Clancy

Yeah.

Dr. Misurac

Because if it comes out and it's, you know, pages and pages long, it just takes so much work to prune that down to a useful documentation that people are not going to want to do that. It becomes more work than it's worth. But with that ability to tailor it down and have it come out pretty close to the way you want, and even if you don't use every component of the note, at least having some part of every note that you use that's really useful to you, people are going to come back and use that tool again and again.

Dr. Clancy

Yeah, great. So a pediatric nephrologist is much different than a psychiatrist, is much different than an ophthalmologist or a radiologist. Are there particular specialties where AI seems to be expanding faster by the nature of the work that you do in the first place?

Dr. Misurac

For sure. You know, we talked a little bit about some of these global tools that can apply for chart review anytime you have a chart to review and for documentation any time you have a conversation with or about a patient that reviews their history and makes a plan. But beyond that, there are several other specialties, especially some of the visually oriented specialties that have had some significant applications with AI. Radiology comes to mind. So in radiology, you know, these algorithms can recognize intricate patterns within the images, and they'll pick up subtle abnormalities that we might miss or radiologists might miss. And I heard it described as kind of like, the difference between a mathematician and a calculator, right? The calculator that is solving some of these problems that are otherwise difficult to do mentally and maybe take a higher cognitive load, but you still need the human factor to correctly interpret it. And so some of the really interesting comments about this have gone around like, are we going to see certain specialties or even physicians

as a whole disappear? And I don't think so, but I think AI is like that calculator for a mathematician. I think it's going to become indispensable. And I think it's going to become such a useful tool that people are going to use it. Some other specialties like ophthalmology, where you can diagnose diseases through the analysis of like retinal images, or neurology where you can predict strokes within those images. All of these specialties have seen rapid advances. Lastly, oncology. You know, IBM Watson has been applied to oncology to assist in cancer diagnosis, analyzing patient data and providing treatment recommendations. And so a lot of these tools, when you feed it data that would otherwise be difficult for us to find the connections in, it can see the connections there.

Dr. Clancy

I heard an interesting statistic that the peak age of healthcare utilization is age 77, and that only 11% of baby boomers are 77 or older. So we have this wave coming of demand for healthcare. And surprisingly, and beating all sorts of predictions, we're in the midst of a baby boom. So even you pediatricians will be busy as well.

Dr. Misurac

Yes.

Dr. Clancy

So we've got this mismatch of demand for healthcare versus what the systems can deliver as far as healthcare. Looking into your crystal ball, do you see AI helping with that mismatch?

Dr. Misurac

I do. I think some of these tools in their ability to improve our efficiency, to reduce clinician burnout, and reduce the people who are leaving medicine because they're burned out—yeah, absolutely. But I do think that medicine as a whole, we need to strike a better work-life balance. I think right now within our field, sometimes the pressure to do more with fewer personnel can be overwhelming and it can really push beyond what people can do. So I think what we have to say is that these tools can help, but we have to guard against using tools like this just as an excuse to pile more work on already overloaded clinicians.

Dr. Clancy

Yeah, you know, I went through, after high school, 14 years of training. You've gone through a lot of years of training as well. Do you see AI as a safe way to allow each clinician to practice at the top of their license? You know, I've got 14 years of training, so I should be practicing with the most complicated patients and you should as well. So how might AI be helpful to allow that and also bring in the team that the pharmacist does the most that they

can do and the PAs and nurse practitioners do the most? Do you see AI is a link and a guide and a facilitator of that as well.

Dr. Misurac

I do, and I think this goes back to that ratio of one hour face-to-face with a patient is 2 hours in front of the computer. Whether that's typing, whether that's chart review, these tools have already leapt forward so far in just a few short years since generative AI kind of became more widespread and known with the introduction of ChatGPT. So I think that we're going to continue to see rapid progress in this field. And my hope is that absolutely this is going to let us start chipping away at that ratio where we're spending more of our time doing what we signed up for, taking care of patients, right? And less of our time typing and just sitting in front of the computer.

Dr. Clancy

Yeah, I hope so too. More and more patients are wearing monitors that monitor their health, or wearables. My watch can monitor my oxygen saturation, my heart rate, my heart rhythm. How might AI help us better monitor and intervene earlier for our patients as well? You know, kind of again, looking at the work that has to be done and obviously intervening earlier is better. So you see AI as a part of the toolbox for that as well?

Dr. Misurac

Has to be, has to be, right? If you think about the vast amount of data being generated by these wearable devices, it exceeds the capability of any medical team to review and find patterns in, and so I think the only way that these data become useful in terms of disease prediction are through AI. But I think figuring out how to implement that, there are some tricky components of that. So let's say you're plugged into your cardiologist somehow through your wearable. Who's reviewing that at 2 a.m. when you have an abnormal heart rhythm? How does that integrate in, like, is there currently someone on call who just runs heart rhythms? Probably not. And where do we turn that over to the AI? And if the AI is responsible for it, what happens if it misses something and makes a big mistake? And people start overly relying on the AI, deferring to it instead of following what the, you know, the patient who says, well, I've got this chest pain, but if there was a problem, my watch would pick it up, my cardiologist would call and I wouldn't have to worry, like I don't have to worry about calling because I know I have, it's a false, it's a security blanket, almost a false sense of security in some ways. But with those limitations in mind, I think there are some exciting advances in wearables, from predictive analytics to say who's going to have a heart attack, remote patient monitoring to say, are the treatments we're doing for your blood pressure working to control it, or patient adherence where can your watch remind you, hey,

take your medicine or don't forget to exercise or these kinds of preventative health maintenance. So the promise is great, but I think there are pitfalls there as well.

Dr. Clancy

Yeah, you know, kind of circling back, you know, precision medicine via DNA has to have AI helping. And precision medicine via wearables has to have AI helping as well. So I'm seeing how these pieces relate to each other, very much so. Another piece is how healthcare gets paid for. And across the US, the health insurance payers, such as employer-based insurance or Medicare and Medicaid, are pushing what we call value-based healthcare models out to the health systems. And here the hospitals and clinician groups take on greater financial risk for the healthcare delivery of a large population over an extended period. So in a way, the health system is also the insurer. The incentive here is for the health system to promote health of the entire population and to intervene earlier in a disease process to prevent maybe an emergency room visit or a hospitalization. What role does AI play in predicting illness for health systems with greater financial risk?

Dr. Misurac

Well, I think that getting back to an earlier part of that question, the old model of fee-for-service, what that promotes is more healthcare utilization, right? The incentive is aligned that the more times I see a patient, the more tests I order, the more that's done interventionally, the more reimbursement that comes to my healthcare institution. And so the changing to the value-based care fundamentally changes where the incentives are. And it's not that individuals are malicious and looking out for ways that they can overuse the system. It's just that when you design a system that rewards utilization, you get over utilization, right? And so again, a lot of what we talked about earlier about intervening sooner, about primary prevention, I think AI can be a key tool that we use to achieve that. But I think also, some of the old-fashioned things like more frequent visits and check-ins from the primary care doctor, from nursing staff for especially complicated patients, for complex care, from pharmacists to take the time to review a medication list with a patient, make sure there's not the polypharmacy. I think some of those are going to also be key elements to lowering costs while also improving healthcare.

Dr. Clancy

I do too. You have a special interest in linking clinician burnout and AI. What have surveys said regarding the drivers of clinician burnout in 2024? What's at the top of the list out there?

Dr. Misurac

Boy, I had such an interesting lecture in medical school from an emergency room physician who told me, burnout is not about hard work, it's about unmet expectations. So you go in expecting one thing, and then when you get there, it's very different than what you expected. But definitionally, burnout is exhaustion of either physical or emotional strength and motivation, usually as a result of prolonged stress or frustration. And in healthcare, you have this combination of cynicism or depersonalization where you see your patients more as cogs in the machine rather than as individual people and emotional exhaustion combined with this low sense of personal accomplishment at work. But I think the things that are driving burnout, it's staffing shortages where you have more and more patients to see because your department is understaffed or because there are fewer support staff than what you really need. Bureaucratic tasks, and this I would put documentation in here, and chaotic work environments. And this is highly dependent on where you work because you can have the same job in two different institutions and have a very different experience.

Dr. Clancy

So from there, again, looking into your crystal ball, how do you hope AI will be helpful there?

Dr. Misurac

One specific way that we've looked at has been the impact of ambient clinical documentation, ambient AI on clinician burnout. And we have a publication that's currently under review, but we put the pre-print out there because we thought it was information that we wanted people to have access to. We're in our pilot group of 35 physicians and APPs. We did the Stanford Professional Filament Index survey before and after. It's a validated burnout survey and found that after the five-week period of having ambient clinical documentation, our rate of burnout dropped from 69 to 43%.

Dr. Clancy

Wow.

Dr. Misurac

And we broke it down then subsequently by how often people were using the tool. And the lowest users had no improvement. And then the quartiles 2 through 4. So even even the below average, but not like the lowest frequency users had improvement and all the way through the rest. And so we feel like that was a major part of our decision to try to bring ambient AI to UI healthcare. And we're trying now to replicate that on a larger scale with our implementation doing a before and after, before we start using the tool, 30 days in, and 90 days to then see is that a persistent benefit. So we're excited about the early returns there,

but I think the larger analysis is going to be really important to helping us understand how these kinds of tools, which have a modest improvement in terms of the amount of time you're spending, but a big improvement in the amount of cognitive load required to complete documentation.

Dr. Clancy

You've done a wonderful job of giving us at least hope as far as clinician burnout, as far as patient experience, as far as some efficiencies, as far as being able to handle the volume of information. So let's change gears a little bit and move to adoption. I led a leadership retreat last year where our junior faculty provided input on initiatives that could improve our clinician recruitment and retention and frankly improve our work environment. From that group, the enthusiasm for AI tools to improve their workflow and save time was incredibly high. I was amazed by their enthusiasm. And this is before we've implemented some of these initiatives. What have you seen regarding adoption as we have implemented the new tools here? You know, we've had our biggest efforts around chart review and for documentation assistance. What have you seen as far as adoption?

Dr. Misurac

So for both of these, we did kind of an all at once or a big bang launch where we immediately just gave access to everyone, had an open Zoom call for anyone to join in and get the training, and then provided the resources out subsequently where that call was recorded and people could hop on to that recording and read the manuals and the work. So launching it kind of all at once, I think has been a successful way. Another approach would be to go department by department, one chunk at a time, and really do that in-depth training. But we felt that these tools were intuitive enough that if we just kind of put them out there with the right support, that we could see some high adoption. And for ambient AI documentation, we've seen more than 1,100 clinicians use it for more than 40,000 patient encounters over just the past two months alone. And our chart review tool, we see about 400 or 500 users per day, helping them dive into charts. And now well over 20,000 patient charts have been reviewed using that tool.

Dr. Clancy

Wow. Impressive. Impressive. Well, I'm very happy that you did the Big Bang. It really, it actually, for me, inspired confidence that rather than just testing it by department by department, you had enough confidence in it that, hey, everybody can benefit from this. Let's put it all out there. So congratulations to you guys of going big rather than step by step by. So I appreciate that.

Dr. Misurac

Yeah, thanks. Thanks.

Dr. Clancy

Yeah. Any advice for those clinicians hesitant to jump in right now?

Dr. Misurac

So I think the first piece of advice is, just start with that first step. Try the tool with one patient. Just get a sense of what it is and then maybe repeat that. Go back, try a few. Make sure you get into the resources that we've put out there for whether that's the manual, the quick start guides, some of those recordings of the educational materials or the short videos to train you. But get into it, start using it. And then if you're still feeling like it's not quite doing what you were hoping it would, schedule some time with the support that's provided from each of these, the companies that are putting these out, the vendors. So each of these companies have been really great to work with where they are providing one-on-one support for people who need it, providing office hours for those who want to jump in and get some of that extra help in figuring out how these tools can work in their workflow.

Dr. Clancy

Yeah, great. Great. Well, you can tell I'm a proponent and I'm a fan. So, you know, I've asked probably 30 questions on the upside. I'm going to ask one question on the downside.

Dr. Misurac

Yeah.

Dr. Clancy

Any areas we need to be cautious in general and any potential downsides to AI?

Dr. Misurac

For sure. And I think one of the things we've thought about as we've implemented these two AI tools is making sure that we're not putting something out there that's just operating with no oversight, with no human intervention, right? Both of these tools, they cite their sources and show their work, right? So you want to be able to dig in and understand how it got to what it's getting, whether it's the documentation tool where you can go back to the transcription of the original conversation to go through and see where did this statement come from, or whether it's the chart review tool where within a couple of clicks, you're back to the original source document that led to that being in there. So I do think that one of the downsides, if you want to flip this on its other side, is having predictions that are based on red herrings or false. So like one example is there was a imaging prediction that was taking

radiology images in predicting which ones are going to have a cancerous lesion on chest x-ray. And it turns out once they got into it and started explaining some of the factors that were leading to its remarkable success, the presence of a ruler within the image, whether the radiologist had put calipers over something, was a key factor in how successful or its success in predicting the cancer. And so I think we have to be careful in understanding that sometimes these tools, they're finding connections we wouldn't find. Other times they're relying on something that's really not reliable. It's kind of orthogonal to what's going on.

Dr. Clancy

Yeah.

Dr. Misurac

So that's one. Another one is that these algorithms are only as good as the data that are put into them. And systematic bias is a huge concern if you're training these systems with data that has existing biases in them. And so we have to be careful that, for example, we're not using training data sets from patients of kind of a monolithic diversity and then applying it to everyone, right? So the generalizability is a problem. That's a concept that people, I think, will recognize from other research endeavors as well. Data privacy and security, if we give some of these tools access to large amounts of data, we need to make sure that the data are handled accurately and are not at risk of being breached. And so that's something that as we've worked with our vendors, we've been very careful about, but I think it's a potential pitfall. And then lastly, I'd put like the over-reliance on technology or the deferral to technology. We have to maintain our critical thinking skills.

Dr. Clancy

Yes.

Dr. Misurac

And we can't get overly dependent on AI because if you have faulty input, you're going to have faulty output, right? And so we sometimes then get to the point where we're overly deferring, well, the computer said I need to do XYZ, but we're not thinking about it, and we're missing something that would otherwise be obvious. So those are, I think, some of the downsides to AI. And look, I think it's important that we're aware of these and taking them into account whenever we're putting into place an AI tool, because AI done wrong can hurt patients, and we need to make sure that's not the case.

Dr. Clancy

Yeah. The other area that I worry about is, in a way, is the AI data that it's relying on keeping pace with society as well. In psychiatry, for years, we had the strong evidence that suicide

risk increases with age. But society has changed. And the pandemic actually accelerated who was at risk for suicide. Age is a risk factor, but a lot of other things are as well now. And so, is it relying on, the past 50 years or is it able to keep up with things that have flipped quickly as well?

Dr. Misurac

Absolutely, yeah.

Dr. Clancy

Yep. You know, I've asked you a lot of crystal ball questions, but as you think about where we're going to be 5 or 10 years from now, where do you see artificial intelligence expanding, particularly in healthcare?

Dr. Misurac

Well, first, I think ambient documentation is going to become more and more ubiquitous over time. This is a tool that takes away a burdensome task from clinicians and allows them to practice much closer to the top of their license.

Dr. Clancy

Certainly.

Dr. Misurac

Allows them to do the things that they signed up for to more closely match the expectation of why they became part of the healthcare team to the reality of their experience as part of the healthcare team. So I think that's one. Another is the predictive analytics, right? So if we can identify these at-risk patients and proactively intervene for primary prevention of many of these major health care issues, then we're going to have we're going to spend a lot less time, money, and effort on chronic disease management and much more on keeping people healthy in the 1st place. And I think AI can provide really useful tools to do that.

Dr. Clancy

Great. So, you know, AI is a key in precision medicine. AI is a key with DNA analysis. AI is a key with wearables. AI is a key with value-based healthcare. A lot of upside.

Dr. Misurac

All of the above. Yes, sir.

Dr. Clancy

Yeah. So you've been great, Jason, and I've asked you a ton of questions. You want to take an attempt at summarizing and what are some of the take-home points you'd like to leave with our listeners?

Dr. Misurac

Yeah, I really appreciate the chat we've had today, but I think that like I said, I think the promise of AI is huge, but we have to carefully approach how we apply it. And so AI, it's a powerful tool, can enhance efficiency, reduce burnout, but careful adoption, thoughtful adoption is key. We have to be aware of the ethics and have responsible patient-centered use of AI. But lastly, the future is very bright for these technologies to truly be game changers and revolutionize healthcare, to increase efficiency, to increase personalization, and to create better health for our patients as a whole.

Dr. Clancy

Well done. Yeah, great job. Great job. Well, to our expert guest, Dr. Jason Mizurak, thank you for joining us on Rounding@IOWA and for the work you've done helping technology help our patients and help our clinicians. I certainly think we'll have you back again because, you know, a year from now, it will be as if seven years have passed. As you have said, we're in dog years.

[Upbeat theme music plays]

For our listeners, you can access instructions for continuing education credits within our show notes. And as always, we hope you will join us again for another session of Rounding@IOWA.