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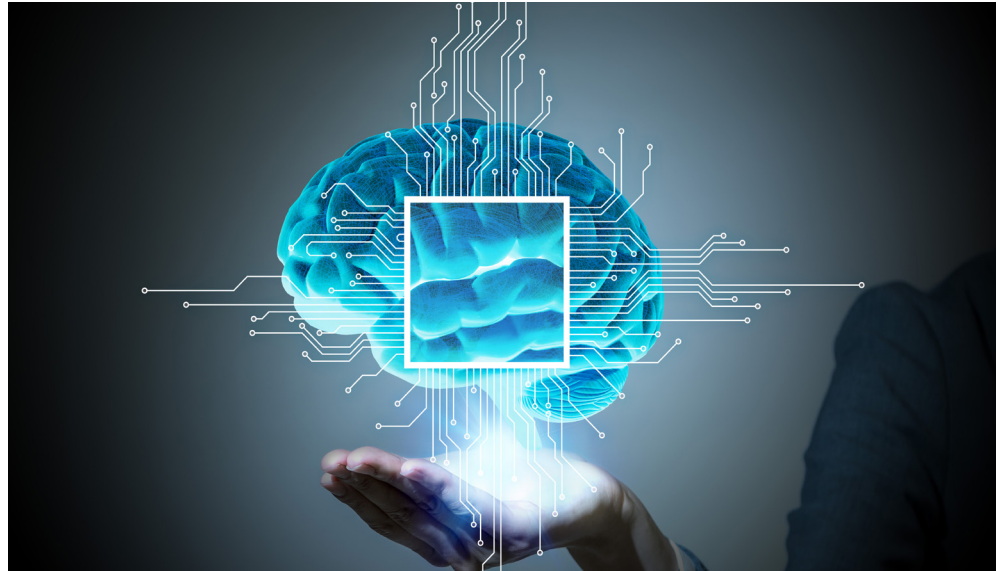
ARTIFICIAL INTELLIGENCE

Determining the role of AI in a
dynamic health care environment

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ARTIFICIAL INTELLIGENCE: DETERMINING THE ROLE OF AI IN A DYNAMIC HEALTH CARE ENVIRONMENT

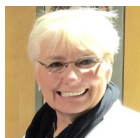


Over the past several decades, technology in health care has been focused on capturing and storing data, and creating a robust electronic health record (EHR) with the goal of deriving insights and intelligence from the data. As most health care experts would agree, we have not yet achieved that goal. However, with the increasing advancements in artificial intelligence (AI) and machine learning (ML), coupled with the data that have been collected, we are now in a position to deliver on the promise of a cognitive system — one that's open, connected and intelligent. Hospital leaders participating in a virtual executive dialogue discussed the perception of intelligence technologies and their impact and influence on health care. They also explored how organizations can define success in the context of implementing AI, the challenges of AI integration and the strategies for addressing these challenges.

KEY FINDINGS

- 1 Confidence in AI and ML is high for use in the clinical setting. But it's important for clinicians to rely on **AI and ML as support tools**, and not as a replacement for critical-thinking skills.
- 2 Use of **ambient clinical intelligence** can streamline physician workflow and reduce burnout by accurately capturing the patient encounter.
- 3 An ongoing **risk for the use of AI and ML** is unintentional bias embedded in AI and ML outputs. It's important that data used to train AI and ML systems is representative of the patient population so that clinicians can make objective decisions.

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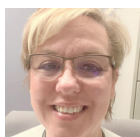
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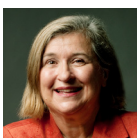
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MODERATOR: (*Suzanna Hoppszallern, American Hospital Association*): **AI and ML are poised to transform health care delivery, thereby enhancing clinical decision-making and care coordination. Heidi, for the purposes of this discussion, how do you define AI and ML?**

HEIDI ZIMMERMAN, R.N. (*Cerner*): AI, ML and big data are buzz words in the industry today. In speaking with clients, I believe we need to level-set and come up with common definitions of these terms. We talk about AI as being the larger umbrella of experiences that mimic human behavior to enhance human capability. It's things like vision, voice, conversation and language with the ultimate goal of reducing the cognitive load on clinicians — the mental energy necessary to take care of their patients. Machine learning is applying statistical techniques to data, finding patterns in the data and then being able to derive additional insights and workflow optimizations based on those data. A predictive readmission algorithm would be an example of that. Big data is the broad set of structured and unstructured content gathered to run against your machine-learning models. The more variety, the more data you have, the more accurate your machine learning models can be.

MODERATOR: **Have your organizations used AI or ML to address challenges brought about by COVID-19? Do you feel that the pandemic will have an impact on how or how quickly health care adopts new AI and ML technologies?**

GINGER HOOK, R.N. (*Trinity Health*): As a result of the pandemic, we've been focusing on our surge capacity and remote monitoring. It's something we were working on prior to the onset of the pandemic. We are working with our vendor to develop dashboards and video monitoring and then using the data to help us better understand patient safety and appropriate treatments. We've used this technology in our COVID-19 settings and it's been helpful.

MODERATOR: **Do you think that your experience of using AI in your COVID settings is affecting your strategy with AI and ML technologies? Will it be slower or faster? Have you changed your priorities?**

HOOK: We've used both AI and ML in other areas to varying degrees, developing automated rules for clinical care, and there is certainly opportunity for us to strengthen and improve their use in the clinical setting. For our COVID-19 patients, similar to sepsis, we're using AI and ML to risk-stratify patients who could potentially face serious health challenges.

ZIMMERMAN: Ginger, for those automated rules, do you have notifications that prompt clinicians in their workflow?

HOOK: Yes, we do in our critical care setting as well as in our medical-surgical department. There are rules that actually trigger alerts to the clinical care team.

ZIMMERMAN: Does it notify them of patient-safety risks?

HOOK: Yes, and it notifies clinicians of a change in patient status.

ZIMMERMAN: That's great. Thank you.

MODERATOR: **Theresa, what are you doing at your organization?**

THERESA BRADTMILLER, R.N. (*Adams Memorial Hospital*): We are a critical access hospital in Decatur, Ind. Although we are small, we have a savvy chief information officer. We aren't using AI in the clinical setting, yet, but we are using AI to support cybersecurity. We have a partnership with Parkview Health, based in Ft. Wayne, that allows us to tap into the same EHR system. As far as future uses, I've been interested in process sets for the predictive analytics to identify patients at risk of decline to prevent

readmissions. We'll get to that point in the future. We're an independent hospital, so we have a lot less red tape. We're pretty innovative out here.

We met with our EOC [emergency operations center] team recently about risk stratification to try to figure out how we clearly define which patients should be classified as patients under investigation during infectious disease outbreaks, such as the COVID-19 pandemic. This is important because it helps us allocate resources and choose care paths. Is the risk level high enough that the patient needs to be isolated? Or is it low enough to remove a patient from isolation, reducing personal protective equipment costs, etc. Through our partnership with Parkview, we now have COVID-19 stratification data available, which helps with this process.

ZIMMERMAN: Do you think that the pandemic actually has accelerated some of the interest in AI integration and machine learning into the clinical space?

BRADTMILLER: For me, I believe it slowed it down initially. Everything was put on the back burner and then reassessed. But now, we're starting to catch our collective breath and return to those projects that we need to continue to provide better patient care. We're seeing how other organizations use AI and ML, and that will accelerate our adoption.

SANDRA ASANJARANI, R.N. (*New York-Presbyterian Health System*): AI has a huge potential. It will help significantly with nurse workflow. Nurses spend too much time on the computer and not enough time with patients. This is a huge opportunity.

MODERATOR: Do any of you use AI to augment clinical workflows?

JOYE BETH ACKERSON, R.N. (*Cincinnati VA Medical Center*): We are not at this time. The VA is undergoing a nationwide EHR modernization and haven't reached that point.

MODERATOR: What are some things you'd like to implement?

ZIMMERMAN: When we think about AI, we often think that it's something flashy and innovative, and it can be. But it's not always that way. Look at how AI is integrated into our daily lives. It's changed how we exercise, how we choose television shows and what music we listen to. It's become a part of our daily activities. But we don't see those types of capabilities integrated into patient care yet. We have the opportunity to apply simple AI technologies into health care.

I'm curious what all of you think are some of the ways that AI will augment clinical workflow. How can it be used to reduce the cognitive load on clinicians? How do you see nurse workflows changing with regard to documentation? How can AI help them with some of their daily tasks?

"AI has a huge potential. It will help significantly with nurse workflow. Nurses spend too much time on the computer and not enough time with patients."

— Sandra Asanjarani —

HOOK: One of the things we're exploring is looking at patient acuity and workload. Particularly, 'How do we level-load our patients to enhance patient safety and throughput for this shift at this moment?' We hope that by using the documentation to pull the information forward, it will allow the charge nurse to know when to give one nurse three patients and another nurse two patients based on workload. We hope that by synchronizing that information with our payroll system, we can take a more proactive look at our staffing ebbs and flows. We're also exploring the use of trigger alerts for our nurses when there's a change in patient acuity — an alert for a patient at higher risk for sepsis, for example. The nurse still relies on her

own instincts and assessment as to when someone is declining. It is an art and a science. We need both.

BRADTMILLER: We definitely feel that it will help nurses. I love the acuity idea that Ginger just mentioned. It would be helpful to avoid all of the paperwork to figure out where the load is. And then, when a patient is declining, the alerts would go to the rapid-response team so that we know which patients to prioritize. That's huge. That would take a load off the nurses. But I don't want us to rely too much on the technology and forget that we have to use our judgment to notice the subtle things the computer can't pick up.

HOOK: I agree. Over time, I've had experiences in which we have seen clinicians shift to being task-driven, following what the computers tell them to do. There's a fine balance as to how we use technology and tools to guide practice, recognizing that systems go down, and we want to use technology to support critical thinking and guidance.

In one of my previous roles, we were beginning to delve deeply into automated learning from radiology systems and using those data to trigger whether a patient would need a follow-up. It's extremely important and will help prevent patients from slipping through the cracks.

ZIMMERMAN: Are any of your facilities utilizing natural language processing to parse through the notes and pull out information like that to trigger follow-ups or alerts?

HOOK: Yes, we are.

MODERATOR: Sandra, what challenges do you see with implementing some of these technologies?

ASANJARANI: I am also concerned about AI replac-

ing critical thinking. My other concern is ensuring that our systems are updated continually. Clinical guidelines change daily, and we need to ensure that our systems are up to date.

ACKERSON: I agree with everything that's been said. From a patient-safety perspective, we have to be careful not to become too reliant on technology. Technology is there to support the clinician. It's a tool. We still need the critical thinking that clinicians provide.

ZIMMERMAN: When we think about applying AI and ML to health care, especially with machine learning models, there are three primary risks we think about. One is patient safety, which we've discussed. The second is model accuracy, which is the percentage of accurate predictions from each model. There needs to be a system in place to monitor the data and make adjustments to ensure that we're looking at the right things. The third risk is unintentional bias, something all of the tech companies are concerned with right now. AI systems are only as good as the data that we put into them, and data can contain implicit race or gender bias, for example. It's important that we think about all of these risks as we introduce AI.

As we apply AI to operations, financials and population health, there's a lot of value in those models, but they don't have a lot of patient-safety risks. When you get to the clinical space, patient safety comes into play and we have to anticipate that these things are going to be regulated.

OFRONA REID, M.D. (Oneida Health): I have not had much experience with AI yet. We're looking into remote monitoring for our patients in rural areas. Often, these patients have patchy cellphone service. We're looking into a device that will monitor their blood pressure, temperature, pulse and pulse oximetry from home using an HDMI cable that connects

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— Joye Beth Ackerson —

to a cable TV.

We're also exploring how AI can help us prepare for the next pandemic, as well as the flu season. We've seen pretty solid examples of the use of AI on the operational side. But on the clinical side, there are still a great number of bottlenecks. As Heidi mentioned, the quality of guidance from AI is only as good as the data going into it. Clinicians input certain measures or metrics into the system from the minute the patient walks into the emergency department (ED) to the moment of discharge. If it's done wrong in the ED, the whole visit from that point on is going to be an issue.

MODERATOR: Ginger, you have quite a bit of experience using AI for sepsis and some other areas. Do you go through a testing process in your system? How does that work in your organization?

HOOK: Yes, we do. A lot of it was trial and error. When EHRs were initially put out there, we had people putting in information in nondiscrete form, so there was inconsistency in the way they entered the information. We learned from that. There is a certain level of vetting and validating information for IT or informatics components, but also engaging our clinic staff in this process. There needs to be some level of prework and education to make sure we get it right.

When we deployed our clinic records, we did a 'Dirty 30,' which consisted of co-documenting in both systems so that we could see what it looked like. We then made tweaks prior to that implementation. We looked at our acuity and the strategies we're using to validate it.

We created test groups among our bedside clinicians to look at how the information is captured

and whether we needed to make changes so that the documentation meets the needs of the clinician at the bedside. There is so much data. We need to apply critical thinking to make sure the system is a value-add versus simply adding a piece of information that can be confusing.

ZIMMERMAN: Ginger, you bring up a great point about the volume of data in the EHR today. That's something most organizations struggle with. How do you see AI really helping you make sense of the data and make it less taxing on the clinicians?

HOOK: From my perspective, I get excited and passionate about how we collate the information in a way that is usable to the right person at the right time with the right dose. We don't dump the kitchen sink in for them to try and figure out which piece is the most important information. The benefit is to collate the data into a picture for clinicians to help them with decision-making. It's also important to understand that the data are available to the clinicians so that, if they want to dig a bit deeper, they can. I would love to see it trigger alerts to the clinicians so they can make decisions at the point of care, whether it's in population health or in the inpatient

settings, so clinicians can use that information more strategically versus just happening to sit in front of a device and see it. Those triggers would help us better strategize with our patients and find the best approach to care.

ZIMMERMAN: Dr. Reid, there's a lot of talk about voice technologies, which I would put under that larger umbrella of AI experiences. How do you feel about using voice to navigate the chart, documents, etc.?

REID: It would be a dream come true because a lot of times the struggle we face now is seeing patients

"I get excited and passionate about how we collate the information in a way that is usable to the right person at the right time with the right dose."

— Ginger Hook —

and then finishing our documentation prior to the patient being discharged from the office setting, and then going to see the next patient. At the end of the day, we finish our charts at home. Through ambient clinical intelligence, we can just walk into a room and speak to the patient and it's documented in the computer. That would be amazing.

HOOK: There are some great concepts beginning to work in that arena with blended models where the patient encounter is recorded and uploaded, and the system provides some recommendations for preventive care. A scribe is assigned to listen in at the same time, making sure everything is recorded and coded correctly. But there is a blended model in which you'll have a scribe who's listening at the same time and taking your information. That piece can absolutely be automated to help our clinicians. As soon as the clinicians leave the room, they are done with that encounter for the day.

ZIMMERMAN: The key is taking what could be a manual, or a human scribe today, and automating that process. That's where the huge benefit would be realized. Have some of your clinicians adopted the process of using scribes?

REID: Yes, we use scribes in different ways. We use them for in-person and virtual visits.

MODERATOR: Theresa, are you concerned overall with the load on both your nurses and your physicians? How do you see this playing out?

BRADTMILLER: It sounds wonderful. We have a lot

of physician offices as part of our network, so this could be a good resource. We're in a rural setting and we're looking into using AI to help us be good stewards of our limited resources, to help us plan ahead and focus those resources. It could be diabetes prevention and management, for example. Is anyone using something like that?

HOOK: If you have a robust regional health information organization, it can help provide that information. There's some great work going on with different organizations. In Indiana, one group is looking at consumer spending and trying to tie that information to an increase in congestive heart failure and infant mortality. There are some great models out there, but most of the work seems to be homegrown. I don't think we've invested enough in population health to get the true benefits yet.

ZIMMERMAN: It depends on interoperability, right? And that's the piece that we're all still working toward, making the data interoperable.

HOOK: Absolutely. While we've started down that path with meaningful use, there's a great deal of work that we still need to do to make it truly meaningful.

ZIMMERMAN: We've spent several decades working on the EHR to enable data collection with the promise that we would receive intelligent insights. Through AI and ML, and coupling that with the big data we have collected, we are now in a position to deliver on that cognitive system.

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— Heidi Zimmerman —

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