ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)

Opportunities for Clinical and Operational Performance

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Intelligence has the potential to transform health care delivery and the patient experience. While artificial intelligence (AI) is still in the early stages of adoption, some organizations have started to incorporate intelligence into their clinical workflow and business operations to improve quality of care, patient satisfaction and engagement, and operational efficiency. This executive dialogue will examine AI and machine learning (ML) use cases, the perception of intelligence technologies, and the current and potential challenges and barriers that hospitals and health systems face in pursuing these strategies.

KEY FINDINGS

1   AI and ML should supplement clinical care, not replace it. By eliminating burdensome and unwanted tasks, AI can allow clinicians to spend more time on direct patient care, focusing on the essential human skills that AI and computers cannot achieve, such as collaboration, leadership, reflection, compassion and empathy.

2   AI and ML can help organizations enhance back-office efficiencies.

3   Building trust through transparency is imperative to achieve buy-in and support for AI and ML adoption.

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MODERATOR *(Suzanna Hoppszallern, American Hospital Association (AHA)*: **How do you currently use artificial intelligence and machine learning?**

JACK LYNCH *(Main Line Health)*: We are not deep into AI at this point, but we are exploring ways AI and ML can help us lower costs and improve the quality of care.

MODERATOR: In what areas are you thinking about applying AI?

LYNCH: Right now, we're looking mostly at revenue cycle. There are examples of health systems applying AI in the revenue cycle effectively.

KREG GRUBER *(Beacon Health System)*: We also are not too deep into AI at this point. We've done some work with IBM Watson and cancer protocols. We collaborate with the Mayo Clinic for oncology, among other things. Through this collaboration, we have access to IBM Watson.

MODERATOR: What about ML, Kreg. Don't you have a fairly extensive data warehouse?

GRUBER: We do. Again, we aren't doing much currently. But we are in talks with several companies to see how we can best leverage the data.

ANDY MUELLER, M.D. *(Centra Health)*: We are using predictive analytics to help with staffing models, particularly in the emergency department (ED). We know there are more opportunities to deploy in the future, specifically in clinical areas and how we assess patients.

JONATHAN LEWIN, M.D. *(Emory Healthcare)*: We are using AI for back-office functions, including revenue-cycle management. And we're using AI for our population health initiative for our commercial at-risk contracts. One area of focus is sepsis. We're using AI in our intensive care units (ICUs) to identify cases of sepsis, so patients can be treated and healed sooner.

MICHELLE HOOD *(Northern Light Health)*: We are doing some interesting work around AI and stroke assessment. It helps improve the timeliness of treatment to prevent adverse outcomes. The AHA Board of Trustees is looking at AI and its potential implications for the field. There are many potential use cases, including applications in population health management.

BRIAN DONLEY, M.D. (Cleveland Clinic London): We have an AI group led by one of our clinicians who organizes that work

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Andy Mueller, M.D.
CentraHealth

Jack Lynch
Main Line Health

for us. He's worked on 19 projects so far and every week he receives more requests from within the organization for new ways to use our data. One of the projects has been to provide personalized prediction of outcomes. And like many here, we are using our data to predict length of stay and readmissions, so we can appropriately channel our resources.

KEVIN MAHONEY *(University of Pennsylvania Health System)*: As part of the University of Pennsylvania, we receive a lot of support for AI from the academic side. But we aren't using AI yet in a meaningful way. We monitor all of our ICUs through a central hub and we are starting to see improvement in outcomes. We are also doing work in sepsis, similar to what Jon described.

MODERATOR: **What parts of the continuum of care do you think intelligence has the greatest opportunity to transform? Why?**

TANUJ GUPTA, M.D. *(Cerner)*: As a bit of background, machine learning is a subset of AI. Both areas have potential to improve health care delivery and outcomes. When we look at health care delivery today, about 90% of a patient's interaction with the health care system takes place once he or she is diagnosed with a medical condition. In the future, we anticipate that about 50% of the patient's interaction will come when a patient has

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> Cerner

the likelihood of developing a condition. That will be driven by ML and predictive algorithms. On the AI side, we believe natural language processing and natural language understanding will enhance clinician workflow by eliminating burdensome documentation. Potentially, we could eliminate documentation for the whole care team. I'm curious about your clinicians' perceptions of AI and ML. Is their viewpoint mostly positive?

LEWIN: There needs to be a fundamental shift in how we position AI and machine learning. We need to move away from presenting AI as tools to help the system, to tools that bring joy back into the work of our clinicians and help front-line workers do their jobs. Anything we can do to move clinicians away from

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the keyboard and facing the patient again will be well received. If it adds another six clicks, it's going to be a problem.

MUELLER: I agree. I do see enthusiasm for AI and ML. It would resonate even more if we could develop simple solutions for everyday tasks that take clinicians away from the patient. That may be coming, but we don't have enough in place now. We're still talking long term.

DONLEY: Much of it is change management. We need to spend more time talking about the potential gains, rather than the potential losses. To further Jon's point, we need to focus on enhancing clinicians' time with patients. We are concerned about clinician burnout. By enabling more clinician-patient interaction, we will improve outcomes and enhance clinician and patient engagement and satisfaction. That's when empathy happens, and when AI can actually reduce caregiver burnout.

GUPTA: I love the idea of bringing back more empathy into the interaction. What if we go extreme and say the purpose of AI and ML is to assist with medical decision-making, so that the majority of a clinician's time is about providing empathy. Medical decision-making still belongs ultimately with the licensed professional, not the software, but it assists

us so we can spend more time connecting with people on a human level. Is that the right message?

GREG POULSEN *(Intermountain Healthcare)*: It's going to be specific to the case at hand. We have some great examples in imaging where ML is saving clinician time and providing accurate results. And, in the future, there will be more instances like that in such areas as the laboratory. I don't think there's anything wrong with adding capabilities over time to make the clinician's job more satisfying and easier. But we certainly shouldn't be positioning it such that our end goal is having the machine make the decisions. We want to make sure that people realize that the end goal is to make clinicians' lives and their interactions with patients more productive.

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LYNCH: I don't think we can have a conversation on this topic without talking about the cost. My concern is creating a divide between the 'haves' and 'have nots.' There are many organizations that can't afford AI and ML. It really shouldn't come down to a health system that has the ability to afford AI and machine learning to advance their care, when those that don't have the money can't. We have to ensure equity and affordability. Who's paying for all of this? As we think about the technology, how do we make sure that it contributes to eliminating burdensome tasks and enhancing performance quality. How do we eliminate disparities, achieve equity for all and make it affordable? Any product that addresses quality, equity, disparities and affordability is going to get a lot of support.

GUPTA: In terms of affordability, what if you are using AI and ML for back office support, to help cut operational costs. Should that be the main focus of AI and ML?

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DONLEY: No, not really. The impact is palpable, but not noticeable to the clinical staff.

LYNCH: Yes, it may be noticeable on the financial side, but the clinical staff would not know the difference. I think with AI, the real opportunity is to achieve efficiencies and savings in some areas so we can direct more resources to direct patient care.

MAHONEY: Absolutely. Much of what we hear with regard to AI and clinical care is provocative. We hear that medical students should avoid radiology because it will be taken over by machines. We hear that software may begin to make medical decisions. But there are many day-to-day things that could be positively affected by AI. We have scores of people who answer phones to schedule appointments. If we could apply AI toward these tasks, that would immediately improve the bottom line and we could hire more nurses to work directly with patients. There are a lot of administrative tasks that we could tackle to enhance efficiencies and, ultimately, save money.

MUELLER: The challenge we continue to have is that by adding technology and other complexities in our systems that have evolved over time, our providers truly spend less time focused on the patients. As we develop the use case for AI in

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health care, I'm less concerned about our providers' ability to provide good care for our patients, and more concerned with them being too distracted to do so. We should focus on areas that add complexity to the system, such as billing and collections. How do we solve some of those challenges, so our clinicians are able to spend more time with patients, to enable them to provide empathy and good decision-making?

LEWIN: It is clearly much more provocative to think about the intersection of AI and clinical care. But I do agree that there are other areas in health care where we can have an impact. We're about to lease another 224,000 square feet of office space to support our back-office functions. One of the big reasons for the move is because the building has 1,900 parking spaces. If some of these tasks could be managed through AI, like scheduling, billing and revenue cycle, we could direct more resources to care delivery.

POULSEN: AI has been around for years. With the development of the electrocardiogram, there was talk that it would replace cardiologists. That didn't happen. We still need cardiologists to interpret the results. We will always need clinicians to interpret test results. One thing that has yet to be addressed is that the reimbursement system doesn't support AI and ML. It's difficult to show a hard return for the direct patient impact. And we still need clinicians to do the work. I'm not sure how we can achieve alignment because we have not invested purposefully. My worry about the future of AI is that there are lots of research dollars and a bunch of capital dollars, but in terms of its becoming mainstream, the payment models aren't there.

MODERATOR: Let's step back for a moment and talk further about the administrative and business functions that could be handled readily by AI. **How do you decide what to invest in? How do you think AI can address clinician burnout?**

MUELLER: The big question is how do we keep our providers from becoming data-entry technicians for the electronic health record (EHR)? Thousands of people have tried to solve this problem, but there isn't anything today that tangibly improves that experience for our providers. We should focus on that to truly make an impact.

GRUBER: In many ways, we've made it worse. We've added technologies and new requirements for clinicians. And we've taken them away from being able to do what they like the most – patient care.

LYNCH: My clinicians would say the more information, the more time they have to spend on the EHR, which has nothing

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to do with patient care and everything to do with billing. They resent the fact that their time is being eaten up so we can get paid. And they would vigorously argue that the time they spend to ensure adequate documentation and appropriate coding doesn't add to the level of care they can provide. In fact, it interferes with their ability to care for the patients. In some ways, what used to be a process where people would review a medical record, code it and bill it, the burden is now on the clinicians to document it in a way that doesn't have to be interpreted by a coder or a reviewer. It can simply be extracted from the health record. That's what's driving them crazy.

MUELLER: Medical education, today, does not truly reflect how clinicians actually spend their time today. If it did, they would spend about 40% of their time learning how to document and code, and how to use the EHR. The rest would be spent on how to treat, diagnose, care for patients, provide empathy, all of those things.

GUPTA: Let's say for a moment that we've solved the financial and operational challenges and we're now focused on developing clinical applications for machine learning in particular. We're working on machine learning algorithms that diagnose and recommend a treatment path. Do you feel there is a place

for that? Do you think clinicians would trust this digital lab test and digital therapeutic?

GRUBER: That happens now. As I mentioned, we're part of a Mayo Clinic network and we have access to e-consults, during which a physician can send digital patient records and a Mayo physician reviews the plan of care and makes recommendations, if needed. It's not a machine doing the thinking, but another physician. The reason it works is because of the relationship and trust that have been built over time. And there's transparency, even though it's happening hundreds of miles away. If it were machine-based, I think it would be accepted if there was transparency and an understanding as to what's behind the decision-making.

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DONLEY: When you look at AI in the financial services industry, there's some desire to not be transparent and that may be good in parts of the finance industry. In medicine, there has to be transparency to AI. You can have a great program, but it would fail at Cleveland Clinic, and other organizations, if there's isn't transparency behind it.

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> Cleveland Clinic London

LEWIN: Yes, to the extent that clinicians want to understand the algorithms to see how decisions are being made. It's going to be a great challenge for clinicians on the front line to trust the recommendations. But if we can show the evidence, then they will accept it more quickly and AI and ML will take off. A good comparison would be that of a commercial pilot. How much time does a pilot actually spend flying a plane these days? They trust algorithms. They trust the auto pilot.

MUELLER: It's not only transparency, but authenticity that clinicians want. That gets back to clinician dissatisfaction

and burnout. Clinicians feel the information they're entering into the EHR, and much of the other work they are doing, is not directly connected to helping patients improve. To win over providers, we have to show that technology is helping the patient.

POULSEN: I agree with that. And, in terms of transparency, clinicians may not need minute details of the algorithm, but rather an understanding of its purpose, what it's trying to accomplish. A good example would be in epidemiology. When a patient presents with a high fever, the physician is able to login to GermWatch, an Intermountain-developed application that tracks actual infections in the community, and receive a recommendation as to what antibiotic would be most effective. It's pretty straightforward. It's incredibly useful and it gets used about 95% of the time. And it gets better as people use it more and more. It's essentially collaborative learning, as well as machine learning.

MODERATOR: **What about areas in which it's not so clear-cut? And the algorithm may have to change depending on the part of the country, the patient population, etc. How are we growing physician trust in those gray areas?**

DONLEY: I think transparency means trust. Transparency builds trust.

LYNCH: For whatever technology we bring in, we must show how it's going to eliminate harm, how it's going to improve quality metrics. And further, we need to demonstrate how it will address equity and disparities in care. We need to show how it's going to contribute to making care more affordable. And when I talk about affordability, I'm not just looking at lowering the cost of care. Maybe it will help generate more revenue or lower the total cost of care over the course of a patient's treatment. Those are the things clinicians and administrators can get excited about. I don't think there is a physician who goes to the bedside who doesn't want to improve quality, improve equity and eliminate harm. When we give them tools that help achieve these things, they will get on board. It's when the purpose and solution is not clear, that's when we get push back.

DONLEY: And we should be clear that it's not just physicians who want these things, it's every clinician. It's everyone who works in health care. So we need to keep that in mind as we bring in new solutions.

LEWIN: We've been able to show some of this in the ED. We have algorithms to help prioritize patients to be seen by the clinicians. Software is also under development that priotized images that need to be reviewed by a radiologist. AI can save a life. It can improve quality metrics and access to care. It's basically augmented intelligence. It's still dependent upon the knowledge base of the clinician, but it helps to improve quality, the speed of care and access.

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>
> – Michelle Hood
>   Northern Light Health

HOOD: For years, we've talked about how to fast-track technology adoption to make sure we are taking advantage of offerings that can transform care delivery and outcomes. And we've focused on how to fast-track best practices and protocols for wider application across the field. AI may be able to play a role in this, helping health care providers prioritize these discoveries that may have the biggest impact on patient safety, efficiency and treatment protocols, etc. That would be something that would get lots of support and it could provide proof of concept quickly around AI.

GUPTA: That's a big point, reducing the time it takes to get research into practice. I don't think we've truly leveraged the big data in health care yet.

LYNCH: Getting back to what we've discussed before, we should focus AI solutions to solve the pain points we are experiencing today. What can AI do to address the frustrations that clinicians are facing? What can AI do to help streamline operations?

MAHONEY: The idea that software can help diagnose and treat patients is great. But we have many things to address before it is fully accepted. Everyone's terrified of the self-driving cars, for example. We're scaring people by saying

computers are going to take over the role of the doctor. AI can help with reminders, for example. If a physician orders a colonoscopy, the software can monitor whether the patient received the test and report the results.

GUPTA: Yes, it can help fill gaps in the care process and ensure patient compliance.

LYNCH: Or follow up on evidence.

LEWIN: And it can enhance the EHR's ability to pull relevant information and share it in a meaningful way with clinicians. In some ways, the handwritten notes were more efficient because we wrote succinctly and highlighted the important points of the patient encounter. It made clinicians' lives easier.

AI needs to help us with our workforce needs. There are many specialties, like dermatology, that are in high demand. We should be able to do a lot of dermatologic work through AI. It's not going to replace the physician because, frankly, we don't have enough dermatologists as it is. AI can supplement the dermatologists and help them optimize their time. The other area in which AI can help significantly is with mental health. A shortage of mental health services creates a tremendous burden and suffers from a lack of resources across the country. And it isn't just a problem in the. U.S. It's a global problem.

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>   Health System

MODERATOR: How can AI help with that?

DONLEY: It can help screen patients and prioritize those in need of treatment. It can help direct patients to the appropriate provider, so patients receive the right treatment at the right time by the right provider. It can free up the specialists to make sure they are spending time with patients who need their care.

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