EXECUTIVE DIALOGUE

ARTIFICIAL INTELLIGENCE

The Power of Harnessing Patient Safety Data

American Hospital Association™
Advancing Health in America

SPONSORED BY: RLDatix™

PANELISTS

Lindsey Dunn Burgstahler **MODERATOR**

VICE PRESIDENT, PROGRAMMING AND INTELLIGENCE

AHA Center for Health Innovation | CHICAGO

Sachin Agrawal

PRESIDENT, STRATEGY, CORPORATE DEVELOPMENT AND DATA

RLDatix | CHICAGO

Bruce Hyman, M.D.

VICE PRESIDENT, MEDICAL MANAGEMENT

Advocate Sherman Hospital | ELGIN, ILL.

Jonathan Perlin, M.D., Ph.D.

PRESIDENT, CLINICAL SERVICES AND CHIEF MEDICAL OFFICER

HCA Healthcare | NASHVILLE, TENN.

Lisa Ishii, M.D.

SENIOR VICE PRESIDENT, OPERATIONS

Johns Hopkins Health System | BALTIMORE, MD.

Roy Rosin

CHIEF INNOVATION OFFICER

Penn Medicine Center for Health Innovation
PHILADELPHIA

Michele Zeigler

VICE PRESIDENT, INFORMATION SERVICES

WellSpan Health | CHAMBERSBURG, PA.

As artificial intelligence (AI) and machine learning (ML) continue expanding into health care, its full potential remains unknown. Health care organizations are beginning to use AI and ML to improve clinical decision-making, enhance patient engagement and make health care providers more efficient and productive. The development of an AI system, however, is only as good as the data used to create it. This executive dialogue will discuss the intersection of AI and patient safety, exploring ways big data can be harnessed to prevent patient harm. It not only will examine key metrics that organizations can use to identify the potential for harm, but it also will explore ways to achieve clinician support and buy-in.

KEY FINDINGS

1. Clinical champions are necessary for any AI application to be successful. Clinical champions can help build trust in the data and can provide support for the necessary workflow changes that must occur.

2. As AI takes a stronger hold in health care, clinicians will need to be retrained to be able to use the data and guidance appropriately and effectively.

3. AI has the potential to alleviate clinician burnout by eliminating redundant and often unwanted tasks, enabling clinicians to direct more time to patient care.

MODERATOR *(Lindsey Dunn Burgstahler, American Hospital Association):* **Are your organizations using AI and ML to enhance patient safety?**

JONATHAN PERLIN, M.D. *(HCA)*: For the past 10 years, we've set up our electronic health information as a platform for a learning health system. Our electronic health record (EHR) is simply a transactional system from which we capture the data byproducts that we can use to continuously improve and form subsequent care, as well as enhance operations. At HCA, clinical examples include using AI and ML to identify patients at risk for sepsis or certain types of cancer; operational examples include tracking patient flow. For our hospitals in the hurricane belt, we are using AI to predict the best ways to triage and evacuate patients when necessary and manage the patient load during crisis.

LISA ISHII, M.D. *(Johns Hopkins Health System)*: Similar to what Jon described, we're using AI and ML predictive modeling for sepsis to identify patients at risk so that we can intervene sooner. And we have a model in place in our neuro intensive care unit to identify patients at risk for decline. On the operational side, we're using it to monitor patient flow.

PERLIN: Sepsis is a good starting place because it's a prominent diagnosis. About 35% of all hospital deaths are due to sepsis and, depending on which statistics you use, it's either the 9th to 11th leading cause of death in the country. For hospital patients, every hour of delayed diagnosis for sepsis increases mortality by 7 to 8%. Sepsis is really a syndrome that is defined by a list of features and the computer can see those features converge before a human might, and that gives the clinical team notice that a patient is at risk. It's lifesaving for the patient; it does things that humans cannot do.

BRUCE HYMAN, M.D. *(Advocate Sherman Hospital)*: We are in a state of transition within Advocate because we're switching our EHR system. At Sherman, we've been on a separate system all along, and we will be one of the last hospitals to transition because of all of the plug-ins we have in place. Everything we've done until now with respect to sepsis is all homegrown. We've developed our own monitoring programs and have continued to tweak those to ensure that we can identify at-risk patients and intervene as needed. Advocate has been on a robust safety journey for quite some time.

MODERATOR: The AHA's Center for Health Innovation is researching AI and your comments about links to one of the findings. One of the challenges organizations are facing is identifying the best approach. We have some vendors who can

help with almost everything and others who are offering very narrow use cases. **Do you see that as a potential challenge?**

SACHIN AGRAWAL *(RLDatix)*: It is a challenge, particularly for smaller organizations that don't have the capital to invest in comprehensive systems. It may be necessary to look for plug-ins. But are those permanent solutions? Do they provide the sensitivity and specificity necessary to truly maximize capabilities? That's always a challenge.

ISHII: We have a unique challenge as a large, academic medical center. Our organization is filled with innovators who want to develop their own solutions. We have many home-grown products that we have to sort through and figure out what we should adopt and scale. It's a good problem to have, but we have to be deliberate and mindful about the direction we take innovation.

PERLIN: One of the common challenges faced by many organizations centers around the ability to harness the data. Data are disparate in their form and they're produced at high speed. The challenge, therefore, is getting the data to be of high enough quality so it can be used to answer a particular question. If you are doing something that's high risk for a low-risk patient, then you want absolute certainty. On the other hand, you might accept more ambiguity answering a "last and best hope" question. We need to get a handle on the different types of data – administrative, clinical, social – that might need to come together toanswer questions accurately. When it comes to AI, there are numerous hybrid approaches. Some analytic providers offer soup-to-nuts technologies that combine cloud services with the use of new AI tools in user-friendly ways. Cloud services, unlike on premises data storage, are elastic and accommodate a data set that once it undergoes mathematical permutations uses significantly more computing space. The big issues are not technical; they are the social, political, regulatory and legal dynamics.

Our society is grappling with the appropriate uses of patient data, and also whether patient data should be used for the common good to advance science and improve care versus a more traditional privacy-centric approach.

– Jonathan Perlin, M.D., Ph.D.
HCA Healthcare

Our society is grappling with the appropriate uses of patient data, and also whether patient data should be used for the common good to advance science and improve care versus a more traditional privacy-centric approach. The Food and Drug Administration has issued guidance for regulations around EHRs and data use to inform clinical decision-making. The entire point of an EHR is to be able to apply algorithms to help inform decisions, not necessarily make the decisions. But under the FDA guidance as we understand it, anything derived from the EHR to help clinical decision-making can be required to be regulated as a medical device, which would be incredibly expensive, bureaucratic and problematic, curtailing what we are trying to achieve.

MODERATOR: So, the regulation would propose that some of these AI models are medical devices?

HYMAN: I believe it comes down to utilization of the software and the output that it gives the clinicians to make decisions. It adds another layer of bureaucracy, especially if it takes years to get approval for every program. It would cripple health care innovation and we would see all of the safety and quality improvements we've made disappear. It would create a loss of focus on the patient and nobody wants a patient to experience an adverse outcome because we don't have all the tools that we need on a daily basis.

MODERATOR: One of the challenges that we discussed is harnessing data. **What are the specific challenges for harnessing data for safety and quality?**

PERLIN: EHRs typically are not the friendliest systems. However, there is much opportunity to enhance the user interface. EHRs, combined with analytics, can help identify a patient who is about to crash before a clinician would detect that anything is wrong. As we rolled out our sepsis system, we've had testimonials from clinicians who said, 'I just didn't know. I was skeptical of this alert, but I'm glad it was there for this patient.' In one instance, we received a testimonial from one of our colleagues whose mother-in-law was hospitalized and whose life was saved by our sepsis detection algorithm.

AI can help by providing assistance with clinical decision-making and removing some unwanted tasks from [nurses] plates.

– Bruce Hyman, M.D.
Advocate Sherman Hospital

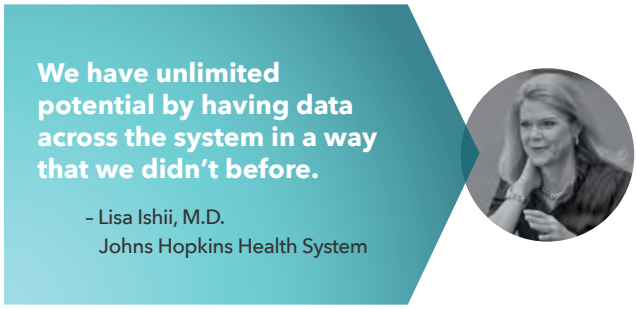
Another challenge deals with the relationship of health care providers to payers and of the government to information technology companies. These relationships are incredibly complex in so many ways, ranging from the issue of intellectual property to data use rights. What's exciting is that new models are increasingly whereby one can develop one model from a dataset, take the model away from the dataset and distribute it for everyone to use. For example, in our system we've built something called Cancer Patient ID. It used to take hundreds of cancer navigators hours to read through all the pathology reports of a biopsy. If you're the person who had the biopsy, you want to know as soon as possible whether you're OK or how to receive the appropriate care. We've improved efficiencies through natural language processing and now those individuals no longer sort through paper but, instead, spend that time caring for patients. What's cool about it is that we can train it on our system with our big data, and the technology company, Digital Reasoning, can can distribute the model for similar use cases elsewhere.

MODERATOR: You touched on workforce changes and, while we won't spend a lot of time discussing the topic, what has been your experience?

PERLIN: It's been positive. Clinicians are able to go back to what they want to do – care for patients. One thing I've been telling my college graduate son is that if you have data scientist in your title, you have a job. We need people who have the tools and skills to develop these algorithms. But we also need a willing set of participants who can use the models. It has to be easily understandable to the end user, the clinician. They are going to be skeptical, so we try to make everything as transparent as possible. That means that data scientists not only need to produce valid and reliable models, but also make sure that the model outputs are understandable.

HYMAN: There's been a significant transition in the nursing staff. Nursing turnover is incredibly high and I think it's due, in part, to the fact that they aren't doing the work they want to do. AI can help by providing assistance with clinical decision-making and removing some unwanted tasks from their plates. We'll need to retrain our staff, though, to use and trust AI. The analytics will provide personalized, evidence-based solutions that allow us to have a team member buy in across the institution.

ISHII: We are just now realizing the benefits of the "clunky" EHR, using the data and the analytics associated with it. We have unlimited potential by having data across the system in a way that we didn't before.



MODERATOR: How are you dealing with the issues of trust and acceptance? How do you get your clinicians to trust the data?

HYMAN: Physicians generally fall into one of two buckets. The older physicians still want paper records; they don't believe in computers. They see the negative stories about data breaches, etc., and they don't want to be a part of it. The other group is open to the EHR. They see the benefits, including being able to see patient data from any location throughout our system. We aren't ordering unnecessary tests because we can see that they've already been done. Our younger physicians are much more tech savvy. They understand. And, emergency department (ED) physicians love any type of AI program that helps them assist patients in a timely manner. In most AI use cases, timelines are built into the algorithm, so clinicians know what needs to be done at what time.

The hardest part is what happens in the office setting, because it's so diverse. It's a lot easier when you have aligned physicians. With affiliated physicians, it can be more difficult to get buy-in for these types of projects. The big question is: 'Who's going to pay for it?' All of a sudden, there's a cost to someone who didn't expect it, and it's a challenge for the individual physician. I have seen a fair amount of enthusiasm for the implementation of these tools. And often, these tools can lower the cost of care because it helps provide more efficient care and eliminates ordering redundant tests. That has to be part of the message that we share with physicians. It will help generate support.

ISHII: That's an interesting point. We don't always talk about the cost of the AI tools, but it's part of the whole picture.

PERLIN: Decision support tools, as mentioned, can lead to the more appropriate, efficient care. As it is now, the path to diagnosis and treatment is not always the most direct. That's potentially harmful to patients. It's certainly not the highest quality of care we're able to provide and it's not compassionate. It uses excess resources, from both a financial and workforce perspective. At the start of 2020, the Centers for Medicare & Medicaid Services is requiring the use of decision support tools to ensure the appropriate use of imaging. Following a yearlong testing and operations testing period, physicians will not receive Medicare reimbursement for tests for which they cannot demonstrate the decision support.

AGRAWAL: Is there a major difference between a fighter pilot using his or her instruments to fly and having inherent trust in them versus physician trust, and the nuances of treating patients differently?

PERLIN: The flight analogy is really good. We can't keep contemporary planes in the sky today without decision support tools. The aerodynamics are too fast for human cognition to respond to effectively. On the other hand, we've seen what happens when a model is not completely validated, as in the case of the 737 Max. There are millions of planes flying with decision support systems with no problems. But acceptance of the technology is being challenged because of the significant failure with the Max. The right answer isn't to lock all of the computers in the safe so that nothing bad happens again. We need to figure out how to create guardrails, so that we can achieve the benefits that are attendant.

ROY ROSIN *(University of Pennsylvania)*: We've been working with AI for several years now, and it's been an interesting journey. We made some of the typical mistakes early on. As

in many health care organizations, our first AI project was with sepsis. The data were excellent and we had phenomenal success in predicting sepsis. But the project essentially failed because nothing changed in terms of outcomes. What we and other organizations have since figured out is that we failed to build the care model around the problem. Care delivery is the core of what we do and, if we don't wrap our care model around the data, we won't succeed.

One of our recent successes focused on palliative care. We recognized that we weren't having enough end-of-life conversations. There's an underlying bias among clinicians that having that discussion means they are giving up on that patient. Data can accurately predict mortality. We've changed our care model to recognize the data and we're seeing a dramatic increase in palliative care and hospice.

Those are two examples, but we've done a lot of things in between. We've been working a great deal on longitudinal patient engagement with virtual care team members. That stuff has consistently worked. But it's raised important questions: 'When can you take the training wheels off? At what point can the bot operate on its own safely?' Those are interesting questions for us. We decided to start in one of the most challenging areas – oral chemotherapy regimens. We started first with medication adherence, and then evolved to symptom and side-effect management. With the first 10 patients, we avoided four ED visits right off the bat. We've expanded this across chemotherapy and into thoracic surgery, enhanced recovery after surgery, the fourth trimester after delivery of a healthy baby, and plastic surgery. We've continued to expand using this virtual care team member and it's been quite successful.

ISHII: We went through similar growing pains that Roy described.

MODERATOR: Sachin, what are some of the interesting use cases you've seen? What do you feel has the greatest potential?

AGRAWAL: Next-generation patient safety and reporting are two areas with high potential. AI, as has been noted, has the potential to prioritize precious capital and workforce resources. We're doing some work in Saudi Arabia, where the government is developing a shared taxonomy for reporting safety incidents. We're going to make sure that we lock down the taxonomy and have a curated way of making those changes. We're now able to point to great practices and also help every single hospital or stakeholder within their benchmarking group to understand where they can actually deploy their data science to help and use operational resources effectively. It may seem simplistic when you think about all of the different benchmarking data available, but it hasn't existed in patient safety historically.

We're now able to point to great practices and also help every single hospital or stakeholder within their benchmarking group to understand where they can actually deploy their data science to help and use operational resources effectively.

– Sachin Agrawal
RLDatix

MODERATOR: Where do you see either a new use case or more generally the greatest potential for AI and ML in patient safety and quality?

HYMAN: A few years ago, we entered into mobile integrated health care. It really stemmed from tracking our readmissions through the ED and the needs of those patients. We started conducting patient interviews and found that many returning patients lacked knowledge of their health care issues. We launched a free service that was run by two paramedics. We developed an analytics program to capture patients with a number of different chronic conditions that also were recurrent. The patients did not qualify for home care; however, the paramedics would visit the patients upon discharge as needed. We'd see five to seven visits by the paramedic over a period of a couple of weeks. The result was a significant reduction in readmissions. Each patient was assessed to see what was needed to ensure optimal care management. The paramedics do whatever is necessary, including building a ramp so a patient could get into and out of his house more easily.

We pay the paramedics' salaries. We purchased two vans because we found that patients didn't want to participate because they didn't want an ambulance parking in their driveways two to three times a week. It has made a significant difference. In the first year, we saved about $2 million in readmissions and lengths of stay. This year, we're on track to save close to $5 million. It's been a fantastic program.

PERLIN: To generalize that point a bit, I think we are finding the most AI value in identification of unappreciated needs – emerging sepsis, unmet social challenges, and unrecognized disease. We have scarce resources and a wide variation of needs in a patient population, so how do we lift some of the burden from our clinicians, so they are able to spend more time with patients?

As we consider the next frontier, we think about tasks that machines may be able to do better than humans. Given the wealth of data that hospitals and health systems accumulate, there are some complex decisions that are just not intuitive to the human mind. That's why the use of AI in sepsis is so appealing. There are many factors at play, but clinicians can't see how it all comes into play. Machines can simultaneously look at blood pressure readings or pulse rate and see the slope of change in a patient. The computer can grasp a pattern.

Another example is creating a safeguard in imaging. Imagine a 62-year-old patient coming into the ED after having a bike accident. The computerized tomography (CT) scan shows no fractures, but there is density in his left lobe that should trigger alarm bells. We've created a program that actually reads all of our CT scans and can find potential tumors or other problems. It not only prevents potentially missing a diagnosis of an early treatable cancer, but it optimizes care. Again, that calls the question as to whether these applications should be regulated like medical devices. These are life-saving examples. If these things become overly regulated medical devices, the degree of innovation that we're discussing here would be absolutely suspended.

ROSIN: Yes. That ties back to my earlier example of our sepsis work. We were creating exceptional data, but the workflow didn't support it. That's a problem we had before, as well. We were receiving incidental findings but not reacting in a timely manner. But now, we are getting the information as much as 12-hours sooner. And since we've changed the workflow, we are making significant improvements. The problem wasn't the data, but our processes. Data science gets us partway and then the care model gets us the rest of the way.

PERLIN: That's an important point. If it's not in the workflow, it doesn't exist. Clinicians are too busy to go outside of the workflow to use a different tool, so there's this notion of integrating with care management. The art of clinical care has to match the data science.

MODERATOR: Will these tools continue to live up to the hype?

ROSIN: I attended a session years ago by one of the early promoters of AI, a company that since has been acquired by IBM. The speaker noted that having the people who create the algorithms is the easy part. The hard part is then creating change. People behave in a certain way and getting them to behave differently is extremely difficult. AI can give us new information, new capabilities and new assets, but if there are no humans to do anything with it, we've got trouble.

ISHII: We're interested in patient access and how can assist patients in self-scheduling. We're developing algorithms that we can build into our EHR to support that. There's a tremendous opportunity here, and we have placed a great deal of focus on that right now.

PERLIN: I have the privilege of working with a group at the National Academy of Medicine called the Digital Learning Collaborative. We're looking at opportunities to use AI and other digital tools to improve value in health care around safety, quality, cost, etc. Obviously, the role of ML has been prominent in our discussions. There's a new book coming out called *Artificial Intelligence in Healthcare: The Hope, The Hype, The Promise, The Peril*. Having previewed it, it's consistent with what we've discussed today about integrating the work and the quality of the data. We want to advance the use cases for AI, but we want to do it appropriately and with the right level of caution. We're optimistic because AI opens up a set of tools that is not only transformative in terms of achieving higher levels of performance, but it reinforces the ethos in health care by allowing us to provide better care to patients and better care categorically to the population.

MODERATOR: How do you decide which technologies you're going to scale to build the workflows around? What are some of the metrics or decision points you use to make those decisions?

ROSIN: One of our top determinants in deciding whether to move forward with a new area is whether we have a strong clinical champion to support it. We need executive support, as well. If we don't have those things, it doesn't matter how good the technology, how good the innovation, it's not going to stick. We don't just need a clinical champion. We need a care team who is going to engage. If I don't have time, if I don't have access, the best work in the world isn't going to go very far.

MODERATOR: Michele, how do you make decisions around priorities and scale at WellSpan?

ZEIGLER: I agree that the starting point is having a clinical champion. We need a clear process owner from the clinical side and good leadership that is engaged so we can make change, because it's tough. We know we'll have some challenges along the way, but with good leadership, we can get through it.

ROSIN: Where to focus work and where to scale are two different things. Where to scale is based on a scientific method approach. The decision to scale is based on our tests and patterns to see if we have what we need to succeed.

We need a clear process owner from the clinical side and good leadership that is engaged so we can make change, because it's tough.

– Michele Zeigler
WellSpan Health

PERLIN: Lisa brought up the issue of patient access. The use cases that we've been discussing have been provider-centric. But there are many areas in which AI can help patients in their self-care. Take asthma, for example. There are applications that gather local and Environmental Protection Agency data on atmospheric pollution and merge it with a patient's blue tooth-enabled inhaler to let a care team know a patient may be deteriorating. They can proactively send instructions to that asthmatic patient. The ultimate stage of this automation hierarchy is machines that actually observe the environment and autonomously make a decision. You might say, 'Hey, that's crazy. That will never happen.' But it already is happening. In LASIK surgery, the machine shuts off the laser if you blink so that you don't scorch your eyelid. The machine directs the surgical laser to the exact tissue that needs to be there. It's an entirely autonomous process. That's a tight use case.

ROSIN: Patient engagement is an important piece. The examples that have been provided show that we can use AI to diagnose at-risk patients for decline or for developing a condition sooner. And then, we can use AI to work with patients who aren't adhering to their care management plans. It's improving outcomes and transforming care.

ZEIGLER: We've had some discussions recently over the pool of data that fits into the predictive capability. What are your thoughts on where those data fit into the whole?

ROSIN: It's interesting. We were pretty early on that journey, but we're building it out at a furious pace. One of the products we're working on right now has to do with medication administration. There are certain genetic determinants in a patient that can make a medication ineffective, requiring a

different prescription. We are identifying these cases about 60% of the time. And nationally, the identification rate is closer to 30%. People just don't have the genome information that they need to do the right thing if you're trying to execute on precision medicine. We are looking at how we can increase the identification of these issues. Our clinicians are brilliant and they know what to do. Often, the problem is missing data or lack of workflow integration to act on that information in the right way at the right time.

PERLIN: That's an intensely personal point for me. My son had a toxic drug reaction because of a genetic response in metabolizing a medication. But there is the potential for AI to assist with this, and I hope that this AI revolution means that no one else's child ever has to experience something like that in the future.

We can use AI to work with patients who aren't adhering to their care management plans. It's improving outcomes and transforming care.

– Roy Rosin
Penn Medicine Center
for Health Innovation

RLDatix™

RLDatix is on a mission to change healthcare. We help organizations drive safer, more efficient care by providing governance, risk and compliance tools that drive overall improvement and safety. Our suite of cloud-based software helps organizations reduce healthcare-acquired infections, report on adverse events, and ensure patient safety learnings are deployed effectively and immediately through dynamic policy and procedure management.

With over 3,000 customers in 19 countries, RLDatix software protects hundreds of millions of patients around the world.

FOR MORE INFORMATION VISIT:
WWW.RLDATIX.COM