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Siemens Healthineers, GE HealthCare Race To Develop Next-Gen AI Solutions For Personalized Care

by [Marion Webb](#)

Siemens Healthineers and GE HealthCare are among industry leaders blazing a trail to a digitally connected, AI-powered healthcare future.

In the view of Peter Shen, head of the digital and automation business at [Siemens Healthineers AG](#) North America, next-generation AI solutions will bring together disparate pieces of clinical data, such as images, laboratory data and pathology, combined with a genetic profile, to drive decisions for diagnosis or tailored treatment.

Shen gave the example of using AI to help predict risk of tumor growth in prostate cancer patients who are under active surveillance by their doctors and undergo biopsies roughly every six months to see if their tumor has grown.

“Now we can use AI to take all this disparate clinical data about the patient to actually determine how effective that treatment is on a patient and maybe make an adjustment where I don’t necessarily have to follow that regimen [such as traditional radiation therapy],” Shen told *Medtech Insight*

“And where we see the potential to take this even further is, if I know then that I can successfully treat that patient who has this specific type of imaging-laboratory-pathology-genomic makeup and with that new personalized treatment, I’ve been able to successfully take care of that patient. Now can I go back to my patient population and look for other patients who have similar imaging-laboratory-pathology-genomic makeup as my one individual patient and apply that same therapy now to that cohort of other similar patients and get similar results – this here is now where we see true population health management.”

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Providing “personalized care solutions” is also where [GE HealthCare Technologies, Inc.](#)’s CEO Peter Arduini sees the future of AI.

In an article from last October, Arduini wrote he expects a future “where AI-optimized images from diagnostic devices like MRI and CT will be combined with a patient’s genetic profile, clinical data such as biopsy or pathology, and biologic and hemodynamic data, to make a diagnosis where the radiologist will see a report, generated by the CT machine, with findings ranked by probability along with suggested therapies and outcomes.”

AI is already playing a major role in medical imaging and diagnostics, where GE HealthCare and Siemens Healthineers are the top players. In medical imaging, AI-based algorithms can help improve the accuracy of images, automate image analysis and reduce the amount of time needed to interpret scans, spot abnormalities and detect changes in imaging that may be too subtle for a human to detect. AI can also be used to improve the accuracy of diagnostic tests, and thus, provide key insights that could lead to earlier detection of disease and better treatment. The goal is to help radiologists and other clinicians become more efficient and effective. (Also see "[GE HealthCare Stretches To The Next Level](#)" - Medtech Insight, 9 Jan, 2023.)

For Shen and his team, who are tasked to find new and emerging technologies they can transform into solutions for their customers and health providers, AI is hardly a new topic. Shen stressed that Siemens Healthineers has spent 20 years accumulating clinical data to develop algorithms around AI.

“We have over 1.4 billion exams and images that we utilize to actually train our AI algorithms,” Shen told *Medtech Insight*. “We actually have the clinical reports and the outcomes associated with each one of these exams, and that’s important as we kind of develop these AI algorithms, because we actually want to make sure that we’re



Siemens Healthineers North America

driving particular outcomes that benefit the patient in the end.”

The company runs 1,200 AI experiments a day with development teams located in Germany, Eastern Europe, Asia, India and Princeton, NJ. It markets more than 65 different AI applications that are either standalone AI solutions or embedded in their imaging or diagnostic devices, Shen said. (Also see "[Medtech Challenged To Build On 2021 Amid Threats Of Recession: Views From Industry Leaders](#)" - Medtech Insight, 3 Nov, 2022.)

Among them are AI algorithms that can recognize anatomical landmarks on patients lying on an MRI machine gurney and pre-configure how that patient

can be optimally scanned.

“Some of that is actually built into our imaging devices themselves,” Shen explained. Other built-in corrective AI algorithms can improve the signal-to-noise-ratio to generate higher-quality images and compensate for sub-optimal scanner settings.

Shen explained that Siemens Healthineers looks at AI as stairsteps in four phases of increasing complexity. The first involves building AI into the imaging and diagnostic devices themselves as exemplified above.

“Where a lot of AI today is being focused [however] on is in the second step, which is around the use of AI for diagnostic assistance,” he explained.

Shen said Siemens Healthineers ranks among many vendors that have created AI solutions for detecting abnormalities within a set of images, such as lesions within the lung that may be cancerous.

“Many vendors, including our own solutions, are these stand-alone AI solutions that identify these abnormalities ... they’re designed to be vendor-agnostic solutions ... these can be utilized by the clinician and complement their diagnosis,” Shen said.

Abu Mirza, who is now in his ninth week as GE HealthCare’s head of digital product and engineering after a nine-year stint at Amazon Web Services, said the firm has 42 medical devices authorized by the US Food and Drug Administration that use AI to create workflow efficiencies, such as magnetic resonance imaging technology that reduces scan time by 50% without

sacrificing image quality.

“We see AI not only improving the efficiency of the diagnosis, but also improving [the efficiency] of the radiologist as well,” Mirza said. These “intelligent assistants” are complementary solutions that can sit next to medical devices, on the devices themselves, or in the cloud, which allows clinicians to collect data, even remotely, analyze it, and quickly take action.



GE HealthCare

One example of an AI solution to help improve image quality and reduce diagnosis time is GE HealthCare’s AIR Recon DL reconstruction algorithm. The software produces sharper images by leveraging raw MRI acquisition data.

During the pandemic, GE HealthCare’s introduction of the Critical Care Suite 2.0, became the first-of-its-kind AI solution embedded within a mobile X-ray system to help clinicians prioritize suspected cases of pneumothorax, a type of collapsed lung. The firm said a review at University Hospital Cleveland showed a 78% decrease in time to report urgent exams and using the device has decreased doctors’ time to flag urgent cases from 3 and 22 minutes down to 44 minutes.

Another example is GE HealthCare’s CT scanner which allows for onsite software upgrades. The ability to upgrade equipment, Mirza says, saves radiology the expense of having to buy a new machine when new features are introduced.

The company is also working on an AI-based platform to help hospitals and health care systems aggregate data from multiple sources and vendors to improve their clinical workflow and increase revenues.

“The Edison Digital Health Platform is being designed to enable health care systems to have a single platform on which to host and integrate apps into clinical workflows,” according to a GE HealthCare announcement from 2022.

Innovation is happening rapidly within GE HealthCare, but acceleration is also coming from collaborations with universities and academic institutions and through acquisitions, Mirza said. In February, GE HealthCare acquired California-based, privately held [Caption Health Inc.](#), a developer of AI-driven software to interpret ultrasound scans and assist in the early detection of disease. The deal came just weeks after GE HealthCare’s buyout of French computed tomography

company IMACTIS. (Also see "[GE HealthCare To Buy AI Imaging Firm Caption Health To Bolster Ultrasound Business](#)" - Medtech Insight, 10 Feb, 2023.)

Mirza said that the premise behind the Caption Health buyout was to help radiologists “avoid errors and improve patient outcomes.” He stressed that AI is not aimed at replacing health professionals, but rather to help them perform their jobs better.

“We believe that artificial intelligence and the technician together will provide the best outcome.” – Abu Mirza

“We believe technology will improve the efficiency [time to do work] and the depth of the work ... The things that you can capture with technology and how quickly you can home in on some of the issues is where we see the benefit,” Mirza said. “We believe that artificial intelligence and the technician together will provide the best outcome.”

GE HealthCare’s Move Into Software Development For Hospitals

More recently, GE HealthCare also made the move into the software-development business for hospital and health systems’ clients where a central facility monitors and allocates resources within a health system.

GE HealthCare’s Command Center software has already been installed at the Oregon Health & Science University, Children’s Mercy Kansas City and Tampa General Hospital to improve operations across their systems.

At Children’s Mercy, the hospital operations center uses AI to manage and prioritize patient beds, predictive analytics to plan for staffing needs and forecast when patients are being discharged, as well as real-time data to prioritize tests, procedures and medicines.

“These kinds of solutions are resonating with our customers,” Mirza said.

Jodi Coombs, executive VP and chief operating officer at Children’s Mercy, said that prior to implementing the software, “the organization relied on manual processes and often retrospective data to understand patient census and anticipate discharges. “Now we have visibility into operations across the entire system to make faster and smarter complex decisions as soon as vital workflows change.”

Barriers To Wider Adoption

Mirza and Shen agree there are barriers when it comes to wider adoption of health AI.

Radiologists and clinicians who have spent their careers diagnosing and treating patients need to determine whether AI's data is helpful, relevant and worthy of consideration, Shen said. Trusting in the data is a huge issue in the health care industry and comes back to how the algorithms are created.

Shen said when algorithms are trained with gender-imbalanced data or only on certain patient populations, it can lead to biased algorithms and that is problematic when it comes to diagnosing and treating a diverse population of patients.

"Here within Siemens, we actually experienced this first-hand," Shen said. "We actually created an AI algorithm that helped us find lung nodules that was based primarily on data that was from, let's say, Western Europe and from the Americas. And it did quite successfully with great accuracy with patient populations in those areas. But when we took that same algorithm and applied it to patients in China, it actually was much less accurate – so we actually had to go and retrain the algorithm with an Asian patient population in order to gain that accuracy."

Regulatory Hurdles

Regulatory hurdles also remain. He said in the US, AI algorithms are approved by the FDA based on what he calls a "batch approach," where the AI algorithms identifies an abnormality that has shown a high accuracy in clinical trials. Any modification on the AI algorithms will require an entirely new application to be considered for regulatory clearance, and that, he says, is holding back overall AI development.

"Ideally you want to have an AI algorithm that once you put it into the clinical setting, it continues to learn and it continues to develop, so as I apply it to that patient population, I'm getting successful results or not successful results – it's learning from all of the information," Shen said.

Mirza noted that the FDA just recently released new [draft guidance](#), proposing an approach to AI/machine learning-enabled devices to "increase patients' access to safe and effective AI/ML-enabled devices in order to protect and promote public health."

The guidance provides recommendations on information to be included in a Predetermined Change Control Plan (PCCP) that may be provided in marketing submission for machine learning-enabled device software functions (ML-DSF). The FDA said that since it introduced the PCCP concept, it has seen "significant interest" in using this mechanism for AI/ML-enabled devices and received a rising number of marketing submissions and pre-submissions, which it expects to increase even more over time.

Role of ChatGPT

ChatGPT has expanded dramatically since it was launched just a few months ago. When it comes to health care applications, it also recently made headlines for performing “at or near the passing threshold” for the United States Medical Licensing Exam, and is seen as having the potential to assist medical professionals with administrative work, manage workflow in hospitals, diagnose a patient’s disease and recommend treatment. But experts also point to the technology’s shortcomings at present, including accuracy issues and biases. (Also see "[How Two Medtech CEOs Are \(And Aren’t\) Using ChatGPT In Their Businesses](#)" - Medtech Insight, 20 Apr, 2023.)

When it comes to applications at their respective firms for generative AI such as ChatGPT, OpenAI’s text-generating AI chatbot, both Mirza and Shen anticipate opportunities, but say it is early days.

Mirza, for one, sees enormous opportunity today for use of generative AI in “back office automation,” which he says is “fairly low risk and very easy to understand the accuracy of it.” In the future, he expects that ChatGPT-like technology may also help engineers in the development of imaging models.

“Today, if you do a base model for each – for lack of a better term – body part, we have to train the model differently,” Mirza explained. “But large language model may create an opportunity where we could create a generic anatomical model and then we train on each one of the organs, so that we can move really, really fast. Today they’re all unique.”

Shen said that generative AI can assist with summarizing patient information and also in pulling together disparate data to quickly summarize it for the clinician to inform a diagnosis or more personalized treatment plan.

When the reporter asked ChatGPT directly about its uses in health care, the chatbot answered, “It can be used in a variety of ways in health care” including patient education, symptom checking, mental health support, chronic disease management and telemedicine.”

It added, “Overall, ChatGPT has the potential to improve patient outcomes and increase access to care in a variety of health care settings” while also stating, “It is important to note that ChatGPT should not replace medical professionals or emergency care in urgent situations.”