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Artificial Intelligence Forges a Path in Health Care
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Bit by bit, various forms of the technology are inching their way into the care continuum.

Artificial intelligence (AI) is revolutionizing the world we live in. For example, robotics is becoming more commonplace in manufacturing, the military, and health care. While it's an exciting time, some health care experts are finding cause for concern, fearing that AI will replace jobs or that too much trust is being placed in the technology too soon. Though these fears must be addressed, it's worth noting the incredible advances AI is making in health care and the various ways in which it may vastly improve the field.

Bhargav Rajan, senior health care analyst for TechVision, the global emerging technology, innovation, and convergence-focused research practice of Frost & Sullivan in India, calls AI the "buzzword of the coming decade," a pronouncement that's hard to dispute. Turn on the television, open a magazine, or hop online and you're bound to see something about AI. Therefore, it's no surprise that Rajan says that every industry wants a piece of AI.

"Health care is no exception," Rajan says. "In fact, health care may be a much snugger fit for AI than some other industries. The primary reason is that the amount of digital health data that are generated is set to increase exponentially. Today health data are generated not only at labs, clinics, and hospitals but [also] right at home. Wearable devices, mobile apps, and home health care devices capture so much of this patient information."

Rajan says the only way to make sense of so much information, which is not always structured, is by using AI and advanced analytics tools. Frost & Sullivan has identified a few specific areas within the health care industry that will be most directly affected by AI, including medical diagnosis, pharmaceutical research and development, clinical decision support, and health management.

AI Pros and Cons
There are countless opportunities for health care to take advantage of AI's wizardry, says Nick van Terheyden, MD, chief medical officer at BaseHealth, who points out the technology's ability to accelerate knowledge from discovery to application.

"Let's take the well-known science behind taking aspirin for a heart attack," van Terheyden says. "Decades ago science proved that giving a patient a beta blocker and aspirin at the first signs of myocardial infarction was the best practice to reduce the impact. But it took 15 to 20 years before this became a common practice. AI gives clinicians the ability to accelerate the timeframe in which we can define best practices, from the point of discovery to the point of clinical care."

According to van Terheyden, AI enables data offloading, captures information, and identifies correlations between data sets, which enhances human knowledge and effectiveness and automates noncore processes so that physicians can focus on patient care.

"For health systems, AI offers the greatest opportunity to leverage the physician's time and the patient's data effectively," van Terheyden says. "It enables us to provide access and critical care needed to improve both our overall population's health and the individual patient's experience with the health care system. In turn, this reduces the per capita cost of health care."

Rajan says the ability to look at microdata and algorithms allows robots to see what humans cannot. "They can trudge through vast and seemingly unrelated information to arrive at a studied recommendation," he says. "This line of thinking goes against the grain of what young doctors are often taught, which is 'Think of horses when you hear hoof beats, not zebras.' This

is to say, in medicine, doctors are encouraged to think of the simplest possible explanation. AI has no such restrictions. AI platforms can be trained to piece together disparate information to diagnose conditions that may not be apparent to a human. AI tools are also expected to improve accuracy of diagnoses and reduce errors."

However, Rajan says AI can "overtrust" or give more value to information than to human reasoning. "Naturally, the biggest con [to AI] is the risk involved in trusting analytical platforms over professionals with decades-long experience in a field—some of whom could be instrumental in developing the field in the first place," he says. "As with robotics, a lingering and perhaps exaggerated concern has been, 'What if the AI platform turns rogue?' That is to say, 'Can the AI platform be trusted with sensitive information?'"

That concern is among several stigmas associated with AI, which include the "dumbing down of people and the fear that we're not working to the top of our license if we use AI to enhance care," according to van Terheyden.

These stigmas can be roadblocks, he says, noting that they exist not only in society in general but also within the medical ranks. Whether rooted in possibility or far-fetched ideas, stigmas must be addressed in order for the concept to progress.

"One that I hear often is that people believe AI is going to take their jobs," van Terheyden says. "While this is a valid concern, AI is not meant to replace humans. And I don't believe it will. Humans, and in this case physicians, have insights and capabilities that machines can't easily learn or replicate."

How Can Robots Help?
If robots aren't replacing jobs, where do they fit along the health care spectrum? Industry experts believe robots can serve many roles.

"There are so many menial tasks out there that are incredibly time consuming and if a robot can take over those tasks, then it should," says Zen Chu, a faculty director at the Massachusetts Institute of Technology (MIT) Healthcare Ventures and Hacking Medicine Institute, part of MIT Health Sciences & Technology. "We should be asking, 'How can we support health care professionals in practicing at the highest level of their certification?' AI is part of that solution."

While some may believe the advent of AI is a recent development, Chu points out that the technology has been around health care for some time, noting that AI has a long history at MIT —in fact, the term was coined there.

Today, the best and most practical application for AI is to consider what functions a robot can perform to increase the value of the practitioner, Chu says. In that sense, AI supports rather than replaces practitioners.

While it's true that the human brain can detect nuances and provide a level of reasoning that a robot programmed to work through algorithms cannot, Chu says AI may be able to provide a higher level of interpretation. "For instance, in looking at imaging diagnostics, you might have robots highlight what they believe to be tumors and then provide those data so that the specialist does not miss something," he says. "That can make you more efficient as a practitioner." However, he continues, the usual place where specialists are going to outperform robots is "any time there is a question—some uncertainty—and that happens a lot in health care. That is where experience and reasoning come into play."

When it comes to how AI is applied to HIM, the approach is similar, says Gokul Solai, MD, CEO of Novatio Solutions, who suggests AI can handle menial tasks to help coders become more efficient. "For instance, going through methodologies and processes to see whether charts are compliant is a redundant and repetitive process that does not add much value to the coder's job. But if we can take those repetitive processes and let AI handle them, you aren't replacing their job but simply making it more efficient," Solai says.

However, just as in diagnostics and other health care applications, when it comes to reviewing charts, Solai says that AI will fall short in terms of responding to nuances. AI's lack of reasoning suggests the relationship between humans and robots must be viewed as a partnership, he notes.

"I think a lot of people hear the term 'AI'—or 'robot'—and they jump to a *Terminator* type of scenario and that's just not how it's going to be," Solai says. "Human skill and robot skill complement each other very nicely. People are really good at interpersonal relationships and reasoning—right-brain type of activities. Robots are best at data crunching and looking at microdata trends. When you partner those two things together you have better outcomes—and that's important in health care."

While robots certainly are not taking over health care, AI has made tremendous advances; there are legitimate reasons to get excited about its potential. "The hype is real," Chu says. "IBM just gave $240 million to MIT—these are real dollars at play for joint research on AI. We're

looking at three big categories: manufacturing, transportation, and health care. There are a lot of dollars being invested into AI and the future is bright."

Dollars and Cents
While no formal economic assessment of AI's effect on health care has been conducted, Chu says the question of whether the technology can lower costs is a "no brainer." For example, he says AI can fill gaps associated with a shortage of physicians, nurses, and specialists and reduce unnecessary treatments.

"We have a problem with overtreatment and a shortage of medical professionals—and that's not going away anytime soon," he says. "In fact, we have burnout driving health professionals out of the system and into early retirement. That means we need to be using the health professionals we have to the highest levels of their certifications. They should be laying hands on patients where it is necessary and not spending time doing tasks that can be automated by robotics. If AI can give them more time to spend face to face with patients, then that benefits everyone."

Chu, who says the health care system is "broken in a lot of ways," estimates that waste costs taxpayers more than $800 billion annually. "That is a massive number," he says. "Automation ought to be used where it can help make economic improvements."

In terms of disease prevention, the economic impact may be significant, van Terheyden says. "It's well known that treatment before major disease development costs less over the length of time," he says. "It's like maintenance on a car. AI machines help organizations leverage their data to assess for potential risk. That can be a financial risk, a regulatory risk, or a health risk within a patient population. This alone can produce economic advantages to an organization if it's actionable."

However, the price tag of the technology may be a roadblock to widespread adoption. "Cost has often been cited as a challenge in the adoption of AI or other similar tools by hospitals already reeling from mounting costs," Rajan says. "It is still early to make predictions about the return on investment on AI tools, considering the lack of clarity in monetizing AI platforms."

Nevertheless, he's convinced AI will play a role in the future of health care. "Personalized medicine is a key concept that health care service providers are internalizing," Rajan says. "This refers to tailoring therapies to suit a patient based on his or her particular health conditions, genetic predispositions, family history, and more. AI will definitely play a central role in this."

In addition, Rajan says the ability of AI platforms to learn and evolve makes them "exciting partners for the future. The future of health care may have AI copilot diagnoses and plan for treatment, along with physicians. While the physician provides the context and offers crucial subjective insights, AI is expected to be the analytical partner."

— *Lindsey Getz is a freelance writer based in Royersford, Pennsylvania.*