Artificial Intelligence in Healthcare – Technological Advancements
(Part Three of a Four-Part Series)

In an ever-evolving healthcare industry, the utilization of innovative technologies is essential to ensure the provision of quality patient care while simultaneously sustaining the financial health of the organization. This third installment of a four-part series on artificial intelligence (AI) reviews recent technological trends in AI innovation in the healthcare industry, including the benefits of AI to providers and patients, as well as the potential future implications of AI.

Many recent AI technological advancements have been accelerated by the connection of AI to the Internet of Things (IoT), which connects various devices to the Internet, and allows them to communicate in some manner. This communication typically involves the continuous collection of automated data uploads by the sensors of the device utilizing IoT to recognize patterns. This innovation serves to automate similar procedures, and allow the AI to flag any data anomalies for human review, or report potential steps to resolve the recognized inconsistencies.

AI already has the ability to supplement the work of healthcare providers by acting as an “advisor” to reduce human error in prescribing and diagnosing. For example, the startup company MedAware focuses on prescription drug use for normal and off-label use of pharmaceuticals. MedAware uses AI machine learning to identify potentially incorrect prescriptions by flagging those that vary from the norm. Additionally, AI machines have been developed to aid providers in analyzing data, by asking the right questions in a timely manner. Pre-AI, big data analysis was nearly impossible, but this process has become relatively easy (and even automated) due to AI such as IBM’s Watson that can use IoT data to recognize patterns that humans may not. Watson is arguably the most well-known supercomputer, achieving international fame when it convincingly beat two “Jeopardy!” champions at the trivia game. Shortly after Watson’s “Jeopardy!” performance, IBM joined with clinicians at Memorial Sloan Kettering Cancer Center (MSKCC) to develop Watson’s ability to suggest diagnoses and the most effective, cost efficient treatments for certain types of cancers. MSKCC clinicians contributed over 14,000 hours toward fine-tuning Watson’s accuracy, and during that period, Watson scanned over 500,000 pieces of medical evidence, two million pages of text, and 25,000 training cases. Additionally, while Watson Health was not designed to be a physician, or to replace physicians, it has been implemented to interface as an “expert counselor” to physicians who are not experts in that particular area of medicine. Watson has proven itself in the medical field by reportedly being able to successfully diagnose lung cancer 90 percent of the time, in contrast to human doctors, who are only able to diagnose it 50 percent of the time. In addition to the clinician collaboration at MSKCC, clinicians at Cleveland Clinic have been central to IBM’s efforts to build Watson Health’s cognitive capabilities. In January 2017, Cleveland Clinic teamed up with IBM’s Watson Health to provide clinicians with help in treating patients and securing data. Utilizing these integrations may allow the rest of the healthcare delivery system to provide better patient care in a more patient friendly way.

In addition to the services that AI may perform to aid healthcare providers, AI also has the capacity to improve patient care, by reducing the burden of maintaining chronic conditions. As previously mentioned, AI may help providers improve diagnoses, in helping to make those diagnoses sooner, potentially resulting in a speedier and fuller recovery of the patient. Further, when patients are diagnosed with a chronic condition, they are often burdened with manually tracking their condition and assuming responsibility for management of the condition. For example, diabetic patients with insulin pumps still have to manually input data, such as food consumptions, to accurately control their glucose levels. Watson and Medtronic, a medical device company, are working to automate these processes so that patients will not have their daily lives interrupted by diabetic care. Through this Medtronic partnership, Watson will be able to predict near-term hypoglycemic events up to three hours in advance. Through this and similar integrations, patients may experience better health outcomes, and clinicians may have a better chance of achieving quality metric thresholds, resulting in higher reimbursement under value-based reimbursement (VBR) models.

AI has the potential to significantly improve the healthcare delivery system from both the provider’s perspective and the patient’s perspective. However, as AI becomes more advanced, the potential risks associated with AI may become greater as well. While AI systems
have the ability to gather data meaningful to achievable metrics and goals, those systems (depending on the user), also have the ability to wreak havoc on other systems, e.g., through cyberattacks or gaining unauthorized access to a provider’s network. Ironically, the best defense against an AI cyberattack is by using AI to monitor network security. Machines can identify attacks and respond more quickly than humans. Because data breaches can cost millions of dollars to resolve, and 90 percent of hospitals have reported a breach in the past two years, providers would be well-served to closely monitor their network and data security, and take the necessary steps to ensure, and even improve, the level of that security.

As the healthcare industry and healthcare technology evolve, both providers and patients may anticipate ameliorated health outcomes and patient care through the provision of evidence-based medicine. AI can also protect providers and patients in the current age of big data analytics, by utilizing AI to thwart security risks and the threat of patient data breaches.

8 Ibid.
9 Ibid.
10 Ibid.
11 Ibid.
13 Ibid.
16 Medtronic, May 2016
17 Ibid.
20 Ibid.
21 Ibid.
24 Bruce Upbin, 2/8/13; “IBM’s Watson is Better at Diagnosing Cancer than Human Doctors” by Ian Steadman, Wired, 2/11/13, http://www.wired.co.uk/article/ibmwatsontomedicaldoctor (Accessed 4/6/17); Roman V. Yampolskiy PhD, 5/8/17
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