

The Future of AI in Healthcare

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The field of artificial intelligence (AI) is changing the world we live in, including healthcare. Healthcare AI offers wide possibility of change-from patient wellness and provider access, medical diagnostics, clinical operations, and optimizing disease treatment modalities. The excitement surrounding AI medical applications seems to be supported based upon analysis from Accenture (a global professional services company specializing in information technology services and consulting) in 2019-2020 showed that promising AI applications could create up to \$150 billion annual cost savings for U.S. health care by 2026. However, despite the vast AI healthcare opportunities, the current health care AI applications are narrowly focused on frontline provider productivity that may translate to improved patient outcomes. At Green Bay Oncology, we have started to incorporate AI technologies into patient care. With these AI changes, we have experienced enhanced provider efficiency and improved patient treatment outcomes.

The demand for oncology care in the United States continues to rise with increasing cancer incidence among all age groups as cancer screening has improved. In turn, cancer deaths have decreased due to improved surgical, radiation, and medical oncology therapies. Because of these two factors, the American Society of Clinical Oncology (ASCO) predicts an oncologist shortage of 2,392 oncologists by 2025. The rural areas, such as Northeast Wisconsin, will experience the largest oncologist shortages. Increasing cancer care demand with worsening oncologist shortage means patient access to cancer care will be delayed. Delay in patient access will affect time to cancer diagnosis, time to cancer treatment, and overall patient outcomes. Provider efficiency must be increased to counteract the oncologist shortage, maintain and improve future cancer care access, and prevent worse patient outcomes.

AI applications have started to improve provider efficiency for Green Bay Oncology in three ways. First, the use of AI integrated electronic medical record applications allows providers to document the patient information while the clinical visit occurs. The time saved from provider documentation is used to increase the number of patients a provider can see in a day thus improving patient access. Enhanced AI driven treatment algorithms is another way AI applications improve patient access. AI can rapidly evaluate multiple patient cancer risk factors, match those risk factors to the patient's tumor pathology, and then present the provider with patient specific detailed treatment options. In the past, this treatment decision making process could take multiple hours whereas now it can be done in as little as thirty minutes following the patient visit. Like AI integrated electronic medical record applications, the provider time saved with treatment algorithm assistance is used to increase the number of patients a provider can see in a day. The final way AI technology is currently being used to improve patient access is through patient medical wearables. These are home monitoring devices that use AI technology to give real time patient biometrics to the provider. This digital interaction reduces the need for

on-site clinical visits and still provide high quality care. In these ways, AI allows for improved cancer patient care access despite an oncologist shortage.

Another primary goal of healthcare AI is to improve patient treatment outcomes. AI applications, to date, have improved patient treatments through robot-assisted surgery and reduction of medication dosing errors. The current developing advancement in AI is precision medicine. Precision medicine is tailoring healthcare interventions to individuals based upon their disease pathology, family history, tumor genomic mutations, cancer staging, and immune profile. In the span of 51 years, between the years 1949 and 2000, the FDA approved 72 novel cancer drugs. In perspective, in the last 23 years, the FDA has approved 145 novel cancer drugs. This explosion of new medications over the last two decades coincides with the medical world's ability to accurately test a patient's cancer for mutations (oncogenes) that trigger cancer growth and encourage continued proliferation. The process of matching a specific cancer's genetic mutation (there are more than 700 mutations to date) to available targeted drug therapy is a complex algorithm. Prior to AI applications, the time to identify the cancer mutation and translate those mutations to targeted drug therapy would take months and was not accessible to all patients. Now, with AI incorporated into this process, matched therapies can be delivered to the oncologist within a few days to a few weeks. This has allowed cancer centers, such as the Cancer Center at St. Vincent Hospital, to provide patients with local access to national clinical trial options and the most innovative targeted medications, thus improving patient's survival and quality of life.

AI technology when integrated into daily clinical practice can change how we diagnose and care for patients. The current health care AI applications, despite being narrowly focused, have displayed the capacity to improve patient outcomes and treatments. With continued AI healthcare advancement, the possibility of healthcare transformation is real.

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