

**A Technological View of Artificial Intelligence in US Healthcare****Aniket Mittal\***

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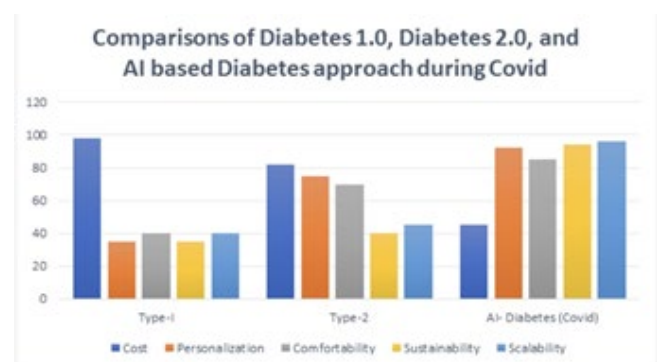
Since the onset of COVID-19 in the United States, hospitals became increasingly burned out—nurses reported higher levels of stress, exhaustion, and a depressive mood [1]. Patients flooded operating rooms; ventilators were in high-demand and medical professionals worked long hours. The use of Artificial Intelligence (AI) has made a large difference. Artificial Intelligence, as defined by leading technology company IBM, is a field that combines computer science and robust datasets to enable problem-solving to make predictions or classifications. A researcher from the University College London and the Lancet Digital Health found that as a result, AI usage in healthcare has significantly reduced the burden on medical professionals [2].

Founder of the Dutch digital health company, Sonohaler, Dr. Bohr explains that Artificial Intelligence is increasingly being used in healthcare and is expected to cut healthcare costs by \$150 billion by 2026. In addition, it is forecasted that the AI-healthcare market is expected to grow to \$6.6 billion. However, there are risks and drawbacks. From the University of Cambridge, in the United Kingdom, Dr. Hamid explains that AI in healthcare offers various risks and opportunities. As artificial intelligence is utilized at a higher frequency in the healthcare industry, it's important to make considerations regarding its effectiveness and its future implementation. While AI in the US healthcare industry can pose potential cybersecurity risks, it serves as an important technological advancement for improving patient care such as monitoring diabetes and improving patient experience but important considerations should be made regarding the safe utilization, patient opinion, and development of artificial intelligence as it is used more in healthcare.

**2. Monitoring of Diabetes**

An important aspect of AI in healthcare involves its use in diabetes treatment and care. One specific component of this is diabetic retinopathy (DR), which the National Institute of Health (NIH) defines as an eye condition that causes vision loss for diabetic patients. However, as Dr. Raman from the Indian Journal of Ophthalmology explains, diagnosis and intervention involve the screening of various images, which AI is often optimized for. While several algorithms have been developed, the US Food and Drug Administration (FDA) has approved

an algorithm by iDx with 96% sensitivity and 88% specificity, signaling that the algorithms identified diagnosis correctly 96% of the time. The use of AI has served immensely towards kick starting intervention, which in turn is essential for improving patient care. AI is an important tool but the use of such softwares yields some risks. Specifically, DR algorithms do not accurately reflect clinical performance and are susceptible to algorithmic bias (poor dataset quality), model variance (changes as different training sets are used), and dataset shifts (distribution of inputs and outputs are offset) [3]. Careful considerations should be made regarding possible risks before patients utilize this technology. The use of AI has been of special importance to diabetic patients during COVID-19. COVID-19 patients are often weak and can't manage their diabetes while fighting off the infection. Thus, intervention, monitoring, and diagnosis should be completed as early as possible. Artificial Intelligence is utilized for diagnosis and improving glycemic management [4].

**Figure 1:** Traditional Approaches

For Type 1 and Type 2 Diabetes vs. the AI-based approach [4].

As demonstrated by Figure 1, Artificial Intelligence performs significantly better in terms of cost, personalization, comfortability, sustainability, and scalability compared to traditional diagnosis and intervention. While not implemented fully in the US healthcare system, AI can be a powerful tool for saving lives and improving patient care, specifically for diabetes.

**3. Improving Patient Experience**

AI can also be utilized to improve patient experiences

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significantly. Dr. Bohr continues that medical schools and hospitals can utilize Virtual Reality (VR) systems to train medical students, especially in surgery. When VR was utilized, students performed significantly better compared to their traditional counterparts. In addition, AI can be utilized to interact more effectively with patients and perform administrative tasks such as going through personal records and optimizing the laborious administrative process. All of such can reduce wait times and improve patient care dramatically. While such robust systems are not fully implemented in hospitals due to approval, efficacy, and AI biases, with important considerations, the use of AI is promising for the future.

AI can also help patients interact with their surroundings. Artificial Intelligence of Things (AIoT) helps connect physical equipment and technology, giving AI the ability to attain human-like senses. AIoT is not only used for precise monitoring of patients, especially those in wheelchairs, with blood sensors, etc. but is also used to improve treatment. Specifically, AI is used in blood coagulation testing (measuring the pace at which blood clots occur to determine the risk of bleeding), connected inhalers (sensors that notify individuals about asthma and medicine need), Bluetooth-Enabled Blood Laboratories (laboratories that independently analyze blood samples to provide crucial information such as the Swiss Federal Institute of Technology in Lausanne) and connected cancer treatment (collect data like pain, heart rate, and weight to determine treatment) [5]. While these technologies are not all implemented in the US Healthcare system, the utilization of AI in healthcare can be crucial towards improving patient care.

#### 4. Risks

While AI has many plausible benefits, it also has various potential risks. Dr. Esmailzadeh, assistant professor at Florida International University, reports that in a study of 307 participants, seven specific concerns were identified. Some technological concerns that were identified include performance identity (the degree to which AI has technological uncertainties) and communication barriers (AI reduces communication with medical officials in the treatment process). They also identified ethical concerns such as privacy (how data may be collected, used, and protected maliciously), mistrust in AI mechanisms (believing AI algorithms are flawed), and social biases (societal discrimination/bias in databases). Lastly, some regulatory concerns were also collected such as unregulated standards (AI not regulated enough) and liability issues (liability of AI tools). Specifically, performance anxiety, privacy concerns, and unregulated standards were considered the highest concerns with statistical power levels of 0.22, 0.20, and 0.21 respectively. As AI is increasingly implemented in society, public opinion must be taken into account.

AI can also impact patients directly due to some fatal flaws. AI often involves system malfunctions such as crashes and single-point failures (hackers can easily gain access) which could put lives at risk. In addition, as shown by empirical examples in 2020, many healthcare facilities fail to store data successfully, leading to 300 million dollars lost for 300,000 patients. In

addition, under the Privacy Rule of Health Insurance Portability and Accountability Act, risk management is necessary to protect patient data and reduce misuse [6]. While AI can be beneficial to patients, it can also affect patient privacy and security, thus highlighting some disadvantages.

#### 5. Holistic Actions for the Future

In order to make considerations for the future, it is important to look at holistic studies—those that take into consideration risks and benefits. An article in the *Annals of Family Medicine* (a peer-reviewed medical journal), the effective use of AI in healthcare means coordination between research and implementation since current research and development isn't geared towards implementation. However, the author continues that AI use increases, stakeholders can necessitate this change and make AI in healthcare more effective [7]. Currently, while AI is ready for stakeholders, it isn't ready for implementation. A similar article from the *Annals of Family Medicine* studies over 90 studies to find that there is a 34% risk of bias with its implementation in healthcare which suggests that AI isn't ready to be fully implemented in the near future unless important considerations are made [8]. While AI poses significant benefits to the healthcare system, it is full of risks so while stakeholders are ready to get involved, full implementation is not yet a feasible option [9-13].

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