DOI 10.62232/barp.8.2023.7441

Healthcare Technologies and Big Data

Natalia Kalandarishvili*
Tamaz Uzunashvili*

*Georgian American University, Business School, 10 Merab Aleksidze Str., 0160, Tbilisi, Georgia.

Abstract

An introduction of AI technologies in healthcare determined fundamental changes in healthcare. We are presenting major trends of adopted AI technologies worldwide in healthcare and current progress and challenges of AI adoption in Georgian healthcare systems.

Using technologies in Healthcare System is a part of the global healthcare development strategies. Capturing data and using them for analytic purposes gives possibilities to measure performance of the overall system.

Artificial Intelligence can serve as robust decision support system for healthcare workers, doctors, nurses, healthcare executives, payers, and governing bodies.

AI is based on the data which is processed by healthcare system players. Key players in Data production are doctors and nurses, who have the first access to the information generated during patient care.

AI can simplify the life of all health system workers by performing tasks which must be done by humans in a faster and cost-effective way.

Artificial Intelligence is the fastest growing business in the world. According to the CB INSIGHTS 2021 [1] was a year of unprecedented AI private market activity. AI funding increased by 108% in 2021 and Healthcare account for nearly a fifth of total funding.

AI is reinventing modern healthcare through machines that can predict, comprehend, learn, and act.

AI platforms are based on big data sources and during analyzing medical data and predicting or coming up with diagnosis, AI can be the way more trusted that humans, who have limited capabilities, according to the physiological and anatomic specification of the human brain.

AI is using data generated by healthcare players, including doctors, nurses, healthcare managers combined in HER systems. Also, field scientists, educational and research materials etc.

AI is using Machine Learning (ML) and Deep Learning (DL) Algorithms and statistical models to perform its tasks. Most important in ML and DL is Data captured in the systems using Electronic Health Records EHRs, scientific materials and medical literature.

However, the benefits of AI are very significant, still the field needs to adopt more regulatory rules for maintaining confidentiality of the medical data, raises more ethical concerns and system protection issues. Several countries are in the process of maintaining internal regulations on using AI platforms. E.g., Singapore adopted Artificial Intelligence in Healthcare Guidelines, which consists with all ruled for using AI systems in the country, to minimize the possibilities of the harm on patient care and population health.

Annually more than 400 000 inpatients are suffering with preventable harm, with 100 000 thousand of death cases, which can be avoided using AI technologies [2].

There are several ways how AI can save lives of patients [3]:

1. One of the most common problems during patient care can be delays, which can mean difference between life and death. AI can detect an issue and notify care teams to provide faster treatment decisions and save lives.

2. Using AI can help pathologists to come up with more precise diagnosis.
3. AI algorithms are used to diagnose and treat illness.
4. AI's deep learning platforms are used to analyze radiology images, blood tests, EKGs, genomics, patient medical history and support doctors in decision making process.
5. AI are used for screening purposes to detect cancer at the earliest stage and support diagnostic and treatment process by algorithms.
6. AI is used to identify harmful bacteria in patient blood and laboratory settings.
7. AI is used in Gastroenterology to identify early signs of GI diseases.
8. AI is used in Imaging technologies like Ultrasound, CT, MRI, and X-Ray for diagnostic purposes. Using big data in their applications, systems can come up with more precise diagnosis, compared with doctors.
9. AI is used in research for clinical trials for new treatment tools, drug development etc.
10. Combining AI and physics, AI can support drug development process and it can be done within days, rather than weeks.

Big organizations started to use AI applications during their everyday operations.

Here are several examples of how AI helped healthcare organizations perform on a higher quality level with better outcomes in patient care.

Cleveland Clinic in United States started partnership with IBM [4] to build an infrastructure that supports research in areas such as genomics, chemical and drug discovery, and population health.

John Hopkins Medicine [5] started partnership with GE Healthcare to adopt a system which supports patient flow process and as a result hospital has assigned patients to emergency departments to beds 38% faster.

AI system Babylon supports doctors [6] with deep learning tools, using symptom-checkers and up-to-date medical information.

AI can be used in healthcare management field, which generates huge amounts of data and usability of these data can be achieved by AI technologies. AI can analyze a data which can be useful for public and population health purposes, for supporting drug development process in pharmacy field, in analyzing payers' information and helping them to predict healthcare costs and make systems more cost-effective, can support governing regulatory agencies in population health management and planning purposes.

Systems used in Georgian Healthcare:

1. Mydoc.ge https://mydoc.ge – already it is used, and they have some statistics.
2. https://www.heaps.ai/index_in.html – we are starting to use this system in American Hospital Tbilisi – this is used for post-discharge follow-up and chronic disease management.

References:

[1] C. Insights, 2021. [Online]. Available: https://www.cbinsights.com/research/report/ai-trends-2021.

[2] "Ministry of Health, Singapore," 2021. [Online]. Available: https://www.moh.gov.sg/docs/librariesprovider5/eguides/1-0-artificial-in-healthcare-guidelines-(aihgle)_publishedoct21.pdf

[3] H. Media, 2017. [Online]. Available: https://www.ibm.com/topics/healthcare-technology

[4] S. Benchaita, "IBM Newsroom," 2022. [Online]. Available: https://newsroom.ibm.com/2022-10-18-Cleveland-Clinic-and-IBM-Begin-Installation-of-IBM-Quantum-System-One#:~:text=Announced%20in%202021%2C%20the%20Cleveland,its%20leadership%20in%20quantum%20computing..

[5] "Johns Hopkins Medicine," 2016. [Online]. Available: https://www.hopkinsmedicine.org/news/media/releases/the_johns_hopkins_hospital_launches_capacity_command_center_to_enhance_hospital_operations.

[6] B. Marr, "Forbes," 2019. [Online]. Available: https://www.forbes.com/sites/bernardmarr/2019/08/16/the-amazing-ways-babylon-health-is-using-artificial-intelligence-to-make-healthcare-universally-accessible/?sh=421f1d713842.