ejpmr, 2023,10(3), 01-05

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Review Article

ISSN 2394-3211

EJPMR

THE SURGING OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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Article Received on 26/12/2022 **Article Revised on 16/01/2023** **Article Accepted on 06/02/2023**

ABSTRACT

Life can be cryptic when you least expect it, fortunately, the human brain and its abilities have extenuated even the most complex of events. Many times than often offered quick fixes and long-term solutions to perennial challenges. Every part of the brain has a purpose and is critical to human function. Through an interdisciplinary approach and technological innovation, the healthcare industry has espoused Artificial Intelligence to simultaneously address better quality healthcare and lower the high costs of health services. Many publications share the vision that Artificial intelligence (AI) in healthcare will achieve the aforementioned goals to keep our healthcare systems sustainable. Artificial intelligence more specifically machine learning (ML)-based AI, has become one of the main technologies driving the so-called fourth industrial revolution yet these most promising technologies of recent years are not reaching the global patients and healthcare systems in need. The latest technologies of artificial intelligence (AI) and robotics support diagnosis, decision making and treatment. These technologies have already achieved notable results that would otherwise not have been envisaged. AI promises to alleviate the developmental impact on the sustainability of healthcare systems throughout the world by improving health- care and making it more cost-effective.

KEYWORDS: Technology, Artificial intelligence, Robotic medicine, Medical Society, Block chain, Intelligent systems, Health systems.

INTRODUCTION

Life can be cryptic when you least expect it, fortunately, the human brain and its abilities have extenuated even the most complex of events. Many times than often offered quick fixes and long-term solutions to perennial challenges. Every part of the brain has a purpose and is critical to human function. Through an interdisciplinary approach and technological innovation, the healthcare industry has espoused Artificial Intelligence to simultaneously address better quality healthcare and lower the high costs of health services. Many publications share the vision that Artificial intelligence (AI) in healthcare will achieve the aforementioned goals to keep our healthcare systems sustainable. Artificial intelligence more specifically machine learning (ML)-based AI, has become one of the main technologies driving the so-called fourth industrial revolution yet these most promising technologies of recent years are not reaching the global patients and healthcare systems in need.

As stated (Higgins & Madai, 2020), Healthcare systems all over the world face tremendous challenges. The age-related illness burden is increasing, particularly in wealthy countries, due to aging populations. The lifetime risk for cancer has reached up to 50% and the lifetime risk for stroke is 25%. As a consequence of the increasing incidence of these costly diseases, along with broadening access to healthcare and major advances in pharmaceutical and technological disease treatment, costs are increasing enormously. Despite a rapidly increasing number of scientific publications describing potential applications, products benefiting patients and our healthcare systems are not deployed at the rates necessary. This translational gap constitutes a major public health challenge in spite of the fact that Artificial intelligence (AI) in healthcare holds great potential to expand access to high-quality medical care, while reducing systemic costs.

According to (Halamka, 2019) Every society has unique strengths, weaknesses, opportunities, and threats. However, healthcare challenges are very similar around the globe. Japan has the urgency, vision and support to change healthcare delivery models in ways that other countries would be smart to emulate. The country will emerge as the leading learning laboratory for digital health innovation, providing the world with technology and policy lessons learned. In most countries, societies are aging. Japan, Sweden, Germany, Italy, and the U.S. have or will soon have more than 25 percent of their populations over the age of 65. At the same time that the population is aging and consuming more healthcare, birth rates are falling such that there will be fewer young

workers paying for the care of the aging. And to make matters worse, medical schools are not graduating enough general practioners (also called primary caregivers) to meet the rising demand for care management.

Data-driven decision-support systems are applied to many scenarios to allow for faster and more informed decision-making. The increasing use of data-driven decision support systems in industry and governments is accompanied by the discovery of a plethora of bias and unfairness issues in the outputs of these systems. Multiple computer science communities, and especially machine learning, have started to tackle this problem, often developing algorithmic solutions to mitigate biases to obtain fairer outputs. (Balayn et al., 2021) reported that many data mining papers, dating from 2008 to 2016, deal with discovering and measuring discrimination within datasets, the results being potentially useful for "debugging" the datasets for later training machine learning models. They investigate scenarios of direct and indirect discrimination, further complicated by additional privacy concerns and cases where the protected attributes are unavailable. Methods. In the study they noted crowdsourcing is an essential component of many machine learning data-driven decision-support system workflows. It allows to collect data samples, or to label these samples so as to create ground truth labels to train the machine learning models on. Consequently, new algorithmic solutions, formalizations, and modelling informed by theory and also system and user-oriented research need to be considered to allow for building database management systems that ensure fairness in the outputs of later trained machine learning models and the systems using such models(Balayn et al., 2021).

WHO Member States agreed towards a step towards a pandemic accord to develop a draft of a legally binding agreement designed to help protect the world from future pandemics(Negotiat-, 2023). This can be achieved if and when such forums embrace the concept of the world being one big puzzle and each and every country and part of the world is part of the puzzle and thus nothing can be achieved without according equity globally. This can be achieved by ensuring the wealth created by AI is distributed fairly, benefits everyone and is safe to be used by anyone anywhere in the world. These challenges may seem abstract and mainly focused on hypothetical issues of humans than AI systems with capabilities far beyond those that exist today. But as we saw and have experienced with the pandemics, the global community should have a focus on scaling up effective solutions to reduce harm and save wasted resources. Ensuring good global health governance around the potential of AI will be vital.

DISCUSSION

Despite medical AI still being a nascent field worldwide, the Japanese government has collaborated and formed partnerships with other industries and academic institutions to develop ten AI-enhanced hospitals by fiscal year 2022. The government of Japan has demonstrated visionary leadership with new policy initiatives including the Next Generation Medical Foundation Law, which became effective on May 11, 2018. Japan seems to be the vanguard in AI, having launched their AI Technology Strategy Council in 2016, naming AI as a key technological foundation for its 5th Science and Technology Basic Plan for the future of Japanese society "Society 5.0". Specifically, the strategy focused on productivity, health, and mobility, with corresponding investments in research and development (R&D), talent recruitment, public data, and start-up companies to address the relative shortage in AI expertise. It further mandated a beginner AI/data science course for approximately 40% of college graduates, 48% within STEM areas, and half of those within the health sciences. Moreover, private efforts to pro- mote medical AI applications are expanding; Preferred Networks, Inc. in partnership with the Japan AI Medical Society created a free online course on the foundations of medical AI. Further efforts by the public and private sector are expected (Ishii et al., 2020). From the study I find this strategy an elixir guaranteed to ensure the potential of AI is achieved and addresses the relative shortage in AI expertise.

It is in the interest of utilizing AI in healthcare that the challenge of overuse of medications in low- and middle-income countries can be extenuated. Overuse in health care is broadly defined as tests or treatments that are inappropriate, unnecessary or of low value and are likely to cause people more harm than benefit. Hence, health-care overuse is a recognized threat to both human health and health system sustainability. Estimates of global overuse suggest that 20–40% of health-care resources may be wasted and that these resources might be better invested tackling unmet need, including un- deruse.3–5 While much of the evidence for overuse arises from high-income countries, where there is greater access to care, the consequences due to overuse may be even more serious in low-resource settings. The findings that only a tenth of studies evaluated potential solutions points to a gap in the literature and the need to intensify research evaluating innovative solutions to reduce overuse, while at the same time improving the rigor of the science assessing the extent and nature of the problem(Albarqouni et al., 2023). Study findings by (Tagde et al., 2021) observe that, healthcare professionals will have access to the blockchain to display the medical records of the patient, and AI uses a variety of proposed algorithms and decision-making capabilities as well as large quantities of data. Thus, by integrating the latest advances of these technologies, the medical system will have improved service efficiency, reduced costs, and democratized healthcare. Blockchain enables the storage of cryptographic records, which AI needs.

The Japanese Association for Medical Artificial Intelligence stated that, currently, personalized medical care called precision medicine has become a global trend. There is no doubt that the latest IT technology and artificial intelligence technology are indispensable for the promotion of precision medicine, and they believe that it is an urgent task in Japan to incorporate cutting-edge IT technology in close cooperation with medical institutions in the field and build a system that can win the global development competition. Through establishment of a society Japan intends to create a system that brings together experts in various fields such as basic medicine, clinical medicine, information science, and system engineering to create a system that brings together the wisdom of Japan to push forward with the common goal of developing the medical AI field (Ryuji H, 2019).

In his report (Ishii et al., 2020) states that, collaborations between hospitals and industry are extending AI beyond the bedside to the system level. Fujitsu Ltd., for instance, has aimed to integrate AI in both administrative procedures as well as the management of patient data The use of AI within disease classification extends to other domains, such as oncology. The University of Tokyo, Shimadzu Corporation, and Juntendo University developed a predictive model that reduced misclassification rates of disease by approximately 50% in comparison with a single tumor marker. Similarly, various institutes in Japan, Germany, the US, and Chile have worked together to enhance histology classification of breast tumors using subtle morphological differences of micro environmental myoepithelial cell nuclei. The deployment of these technologies in rural or resource-challenged areas of the country may maintain a high quality of care while reducing the need to transfer specimens across institutions. The applications of AI use in pathology may also promote the development of other telemedicine. In conclusion Japan is working to develop a medical education system to create a workforce competent in the utilization, evaluation, and improvement of AI and to deploy thoughtful multidisciplinary and multilateral efforts to identify and disseminate best practices from patient-care to system-wide management. Through such an approach, it is uniquely situated to demonstrate to the world a well-designed roadmap of an AI-driven future of healthcare.

It is my belief some countries and continent need AI in comparison to others, I am in Japan and the level of AI collaboration health via their health systems is one to benchmark. A procedure that will take months to procure and perform takes minutes in simple clinics that are mostly on the peripherals of bigger referral hospitals. This is supported by (Gebremeskel et al., 2021) who stated that, Health systems in Africa are attracting more attention than before as these fragile systems have previously struggled to respond to the effects of health emergencies and pandemics. After the 2014 Ebola outbreak in parts of Africa, governments were encouraged by the WHO to improve the resilience of their health systems. This led to advocacy for a clear and concise definition of health system resilience. Fragility is the insufficient capacity of the state, system and/ or communities to manage, absorb or mitigate risks. Resilience is what happens when a health system adapts to shocks or stress in a context of robustness. Health system resilience has been defined as the ability of health actors, institutions and populations to demonstrate absorptive, adaptive, accessible and transformative capacities to prepare for and effectively respond to health system shocks and disturbances. Health system resilience is directly linked to health system governance that is, resilience depends on the choices of groups and individuals as they make, change, monitor and enforce the rules (formal and informal) that govern the health system. However, resilience requires robustness. While some health systems have demonstrated features of adaptiveness in responding to a new challenge, such adaptiveness can only go so far in the context of weak, fragile and non- robust health systems. Many countries in Africa have lean health financing and infrastructure development. With 25% of the global disease burden, sub- Saharan Africa has 3% of the world's health manpower.19 One in three Africans—422 million people are estimated to earn below $1 a day20 in rural areas. Weak health systems' response to the COVID-19 pandemic could easily precipitate a monumental socio-economic crisis. There is a clear and present need to improve the resilience of health systems across Africa. It is an inevitably daunting task (given variations across the continent) which WHO has been at the forefront of championing.

In Africa, the leverage of mobile phones and technology has really been espoused to the extent that in a country like Kenya electricity bills, water bills, taxes, school fees, hospital bills and basically almost all goods and services can easily be paid via a mobile phone. This is such an innovation that I hope can be cascaded into AI in healthcare. If someone invented mobile banking surely someone has the potential of inventing more in the healthcare industry. Maybe all they need is a chance and support. The amount spent on health has been abysmally low, especially in sub-Saharan Africa, and the poor level of health infrastructure in countries such as Tanzania, Zimbabwe, Kenya and Nigeria has been linked to a lack of long-term investment in health. Hence, there is less health infrastructure development with a plethora of underfunded public health facilities in the region. There are deep- seated challenges posed by poor construction and lack of appropriate technology which are compounded by wrong siting/location of key health infrastructure due to political considerations. Health infrastructure development in many African countries is controlled by governments. It is hard for public organizations and governments alone to respond sufficiently. This makes a case for diversifying responsibility among key players and establishing partnerships with private (including non- profit) actors

within and across countries in the region(Gebremeskel et al., 2021). Health systems need training, supply of technology and transfer from paper- based to electronic data collection systems. The last two decades have witnessed the rise of mobile health, incorporating mobile phones, tablets and other wireless devices into heath programmes. This high mobile phone penetration in Africa can be leveraged to organize training and disseminate vital information for tracking, monitoring and addressing emerging needs in disease outbreak situations. This is evidence that the leverage of AI in healthcare will be more of a success story than a pilot. As a matter of fact, hospitals at the apex of African countries are slowly but surely ensconcing themselves with the concept of AI.

Health investments have often been misaligned with needs, with prioritization of individual health care over public health interventions, emergency response often superseding preparedness, prevention and promotion, and with little emphasis on primary health care or on communities as the center of decision-making. Issues beyond the health sector such as changing demographic patterns, climate change, changing land use, de-forestation and increased animal-human proximity, coupled with increasing population density and globalization are increasing the likelihood of further pandemics or other crises (Ghebreyesus et al., 2022).

Intelligent systems offer great possibilities and we don't need another pandemic to inevitably shift our paradigms on how to bridge machine intelligence and human intelligence with the goal being to enable and widen the acceptance of AI systems by human subjects, we can cascade and envisage ourselves in a better, faster, safer and quality healthcare environment through embracing AI, a good example being the utilization of automated thermometers in majority of buildings nowadays. In this sense, As indicated by (Angelov et al., 2021), in the medical domain there is a growing demand for AI approaches, most notably during the COVID-19 pandemic. However, AI applications must not only perform well in terms of classification metrics, but need also to be trustworthy, transparent, interpretable, and explainable, especially for clinical decision-making.

The shift in surgery toward minimally invasive approaches requires transitioning from an analog world to a digitally transformed system and presents a huge opportunity in this emerging field. Artificial intelligence (AI) in healthcare has the potential to transform the role of doctors and revolutionize the practice of medicine. The convergence between AI and medical robotic technologies creates an interesting area for research and development activities for the medical technology industry. Some challenges with the use of AI in medicine include the issue of legal liability and attribution of negligence when errors occur. Despite rapid improvements in robotic-assisted surgery over the past decade, the level of adoption remains low due to high costs, which is cited as a major challenge (Loh, E. & Nguyen, T. 2022). Endorobots can empower the user's perception by accessing the human body through natural orifices or small incisions. Improvements in new available technologies, in designing miniaturized sensors and actuators, in new smart materials, and in powerful computational units to implement complex real-time control strategies have paved the way for new design paradigms.

As indicated by (Denecke & Baudoin, 2022), healthcare is shifting toward becoming proactive according to the concept of P5 medicine–a predictive, personalized, preventive, participatory and precision discipline. This patient-centered care heavily leverages the latest technologies of artificial intelligence (AI) and robotics that support diagnosis, decision making and treatment. These technologies have already achieved notable results in the prediction of sepsis or cardiovascular risk, the monitoring of vital parameters in intensive care units, or in the form of home care robots. Still, while much research is conducted around AI and robotics in health care, real-world care settings are still limited. To remove adoption barriers, we need to address issues such as safety, security, privacy and ethical principles; detect and eliminate bias that could result in harmful or unfair clinical decisions; and build trust in and societal acceptance of AI.

Artificial intelligence (AI) promises to alleviate the developmental impact on sustainability of healthcare systems throughout the world by improving health- care and making it more cost-effective. In clinical practice, AI has often come in the form of clinical decision support systems (CDSS), assisting clinicians in diagnosis of disease and treatment decisions. Where conventional CDSS match the characteristics of individual patients to an existing knowledge base, AI-based CDSSs apply AI models trained on data from patients matching the use-case at hand(Amann et al., 2020).

CONCLUSION

AI's ability to absorb, digest and process enormous amounts of data towards informed decisions that are complex to a human is not negligible and the its likely to become even more impressive in the future, its effects have been so significant that you can see roughly when it occurred by looking at historical data of health, economic output and population. Consequently, healthcare development should essentially embrace the concept to fulfill the aim of AI in healthcare: better care at lower costs, extenuating of the AI crisis and challenges for example planning, global outreach, accountability, transparency, safety and ethical issues need to be addressed and the potential, expeditiously achieved since the significance of AI in health is easily assented upon than debated.

ACKNOWLEDGEMENT
I would like to acknowledge Nagasaki University in Japan, KEMRI Graduate School/Jomo Kenyatta University of Agriculture in Kenya and Kenya Medical Training college for the moral support.
Contributors: Salim Omambia Matagi is the sole author and responsible for ideation, writing, images and submission.
Funding: The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not- for- profit sectors.
Competing interests: None declared.
Patient consent for publication: Not applicable.
Ethics approval: This study does not involve human participants.
Provenance and peer review: Not commissioned; externally peer reviewed.
Data availability statement: Data sharing not applicable as no datasets generated and/or analyzed for this study.
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