International Journal of Social, Humanities and Life Sciences ISSN XXXX-XXXX
Vol. 2, No. 1, 2024, p. 26-36

Challenges and Benefits of AI Adoption in Healthcare: A Global Perspective

Murad Khan[1], Abdul Mannan Khan Sherani[2]

[1]American National University, Salem Virginia

[2]Washington University of Science and Technology, Virginia

[1]khanm@students.an.edu, [2]asherani.student@wust.edu

Abstract

One of the most significant trends of today's healthcare is based on the usage of Artificial Intelligence for the changes of the whole healthcare system, as well as the evolution of the diagnostic tools, the uniqueness of approach to patients, effectiveness of the option that is needed for organizing the system of Healthcare. The following possibilities schooled that information technologies and, in particular, artificial intelligence can solve the problems of the growth of costs and deficit of the health care workers and uneven distribution of the health care all over the world. However, with II also come its disadvantages such as data privacy influences; biases in algorithms; regulatory limitations; and resistance from staff, including healthcare providers. Ironically, liberties of ethic such as openness, responsibilities and evenhandedness may be taken to right structures of AI are used. Thus, from this paper, we are recommending that as AI advancement continues there is an opportunity in healthcare of improving the IoMT via integration of block chain to offer better, faster and secure patient care. At the same time, at the patient level, it has integrated the concept of individual and precision medicine based on artificial intelligence state for changing the algorithms of treatment by offering individual treatment based on genomics and phenotype of patients. But, learning from these accomplishments there are some challenges to the development of the health systems worldwide including; low toned technological equipment to make relevant, affordable, and adoptable Artificial Intelligence solution. In addition, it assumes the specification of the right policies and of ethical code of conduct as well as the continuous co-engagement of AI, clinicians and policy-makers. Here are the issues for which there could hardly be any arguments as to why AI can and will revolutionize the delivery of healthcare in future to become Fair Efficient and with Patient-Centricity across the world.

Key words: *Artificial intelligence in healthcare, diagnostic competence, personalized care, AI-based business processes, data protection, AI bias, AI legislation, AI development, Internet of Medical Things (IoMT), block chain, precision medicine, disparities in health care, globally, and health, care, sustainability.*

Introduction

Like any other industry, Health Industry will also not miss experiencing the advance of AI as it slowly, but steadily poring its way into the industry as the way to better solution, work, efficiency, and costs. It also means that through the help of AI the chance to shift the focus of the healthcare system has never been as good as this. For simplicity, AI can be implemented by organizations under the following categories; Machine learning and natural language processing and Robotics and Computer vision [1]. This advancement is used in diagnostics, in therapeutic strategy, in the whole concept of individualized medicine and in pharmacology and by all means in management. The interactively applied Artificial Intelligence is special because it produces the value in question right on the spot at a faster and more accurate pace as the interpretation of the larger amounts of detailed medical information required for the intervention by the healthcare providers to be efficient, focused, and timely [2].

Global health care systems experience several pressures, some of which are; rising costs, scarcity of human resources, disparities in service delivery and increased customer expectations brought about by advanced ages and incidence to chronic diseases. As will be shown in the parts of this paper below, there are many apposite ways for the IVY to problem solved with the assistance of AI. For instance, diagnosis applications with AI have been integrated into the health care services where cancer, heart diseases, neurological diseases at stage one that clinician. Third, the application of the decision support systems that have their basis in artificial intelligence, can permit the right decision to be made and can also improve the quality of treatment provided to patient's data [3]. Nevertheless, it was mentioned that the problem free existence of AI will not be possible because its usage in health care will increase in near years. However, there is cutthroat opposition when it comes to gaining new AI into running a health care system for the reason that.. For the third key factor again, it is thought that over 50% of the healthcare facility may not have the technical support systems or the human resource which would be required to support AI techniques. But data ownership, data security and what might be considered as rather frequent appeals to artificial intelligence in decision making still remain a question. For instance, when the AI models corrupt the training data with bias or covered partial subset, then, the models of health inequality because limited variation of the care dispensed to patients [4].

However, the Global has overview of the AI in the healthcare also shows the future and challenges which one encounter in the journey. Almost all nations in the world, local governments, healthcare related institutions and companies and individuals who are involved in designing and creating technologies with AI should consult how best to integrate this facet of intelligence in the global and local societies in a way that will maximize on the benefits that this improvement brings with it, but minimize on the negative impacts [5]. Should some specific ethical problems be solved, regulation issues addressed, and accessibility questions answered AI brings the healthcare delivery to the new level for the sake of the patients and the world.

AI integration a Strategic Business Imperative: Benefit of Health Care Delivery Systems

The advantages of determining AI in the current health care systems include the following advantages that people in health care delivery system will benefit from include. This bears with it one of the most entered advantages I associate with diagnostics as being that artificial intelligence enhances the accuracy level of that process. The health sector is one of the fields where AI is used more actively and the machines using both reinforcement learning and deep learning can analyze, generally truly huge volumes of health information, from diagnostic pictures through lab results, genetic data etc., almost with unrivaled accuracy. For instance, today's application of AI in outpatient departments such as radiology has shown that it performs far better scans of body imperfections like tumors, breakages of bones and other diseases morbidly than human practitioners. Of these tools, the health care providers may wish to use them with an aim of reaching a differential diagnosis which would help in early diagnosis of a number of diseases hence improving patient status [6]. The other great advantage is that in the same manner, with help of AI one can come up with power in the sphere of the individual approach in medicine. In patient treatment, several factors such as the patient's medical record, gene tubing, and others when taken to the artificial models of intelligence, treatment strategies ideal for the patient can be worked out. This striving not only results to optimization of treatment sessions, but also dampens the impact of an undesirable interaction since the therapies offered by the present differ molecularly to the body systems of the patients. These actual information also substantiate the AI real-time recommendation that facilitating clinicians should offer timely and sufficient care so as to improve the standards of care [7].

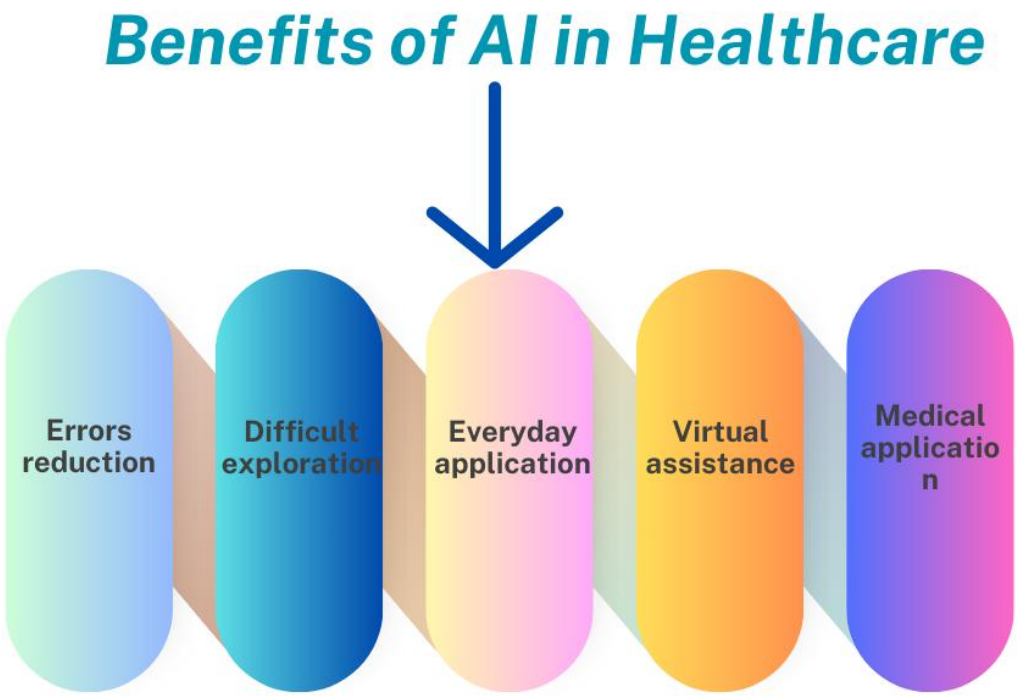

Figure: 1showing benefits of AI in healthcare

But there is also the efficiency that AI bring in the performance of the functions of the business organization. Health care systems' facilities have concerns in relation to flow which include; appointments, patient traffic and reimbursement. Many of these can be accomplished with the help of an AI which ultimately saves time that health care professionals should be spending on the patients. For example, the conversation interfaces comprised of conversation agents, the appointment keeping for patients and responding to inquiries from patient could be handled by the conversation machines while the learning algorithms; the machine learning could mean rationing of human and material resources including space in the hospital according to necessity [8]. It also impacts increasing patient gains by improving reliability of the predictive analysis in the context. The use of decision support algorithms developed from patient records enables the system to early identify most health incidences encompassing hospitalization and chronic diseases among patients.

The consequence of such predictive ability is a reduction in the likelihood of decline of some disease states, and therefore less future healthcare expenditure occurs. Cells, much more so, believes that with the assistance of this kind of technology, identification of new drugs could quite possibly be made easier or if not, then could be speed up by examining structures of different compounds and how these could most likely, react with diseases. Analytics implementation to healthcare systems is the change that holds new hot opportunities to affect diagnosis, new ways on the treatment, increase of productivity of the healthcare organization, new prognosis of the results of treatments for patients [9].

Challenges when implementing AI solutions for international corporations

While the benefits of applying AI integration techniques to enhance healthcare processes are enormous, there exist however tremendous difficulties in applying artificial intelligence solutions on the global level. Consequently, one of the issues is determining what data quality and data availability mean. The vast majority of AI algorithms uses training data, which is a large dataset to locate and make predictions on. In fact health care data in different parts of the world may be financial, incomplete and often inconsistent. In general, paper-based systems still dominate the healthcare data in the developing countries, and unless each patient data has been entered in the computer, or there is standard format for all the records, it may not be easy to retrieve them [10]. In addition, it only depends on user input data and is prone to the data it takes; discriminative outcomes minimize the data and bias knowledge Deficiency, which is a significant concern when we have a diverse population with diverse health care needs.

Figure: 2showing challenges of AI in healthcare

The latter is another major issue – the technical infrastructure of AI technologies introduction. This calls for higher computing ability and backup from a sound IT structure, which is difficult from an AI upstream healthcare setting from low end or rural health care units or centers. For instance, AI based diagnostic applications may sound as lacking sufficient imaging system and internet connection; while other establishments in the healthcare may find that they are expensive to adopt full implementation of the technology. This is because organization needs a more rigid structure to accommodate use of Artificial Intelligence tools [11].

Also are ethical regulatory barriers to its use to be taken into account to arrive at the cliché – it is not what it used to be. It is therefore mandatory that; AI systems working in the healthcare sector should take into consideration the Principles of Ethical Communications, these have concerns to do with Privacy or confidentiality, Consent and Fairness. This is because there are negative aspects of AI being implemented into different decision making processes is that it will replace the human judgment which will leave behind effects that will undermine the patient's confidence [12]. Some of the countries that have established healthcare rules and regulation may not have developed sufficient rules for the AI technologies. Some of these uncertainties or 'loopholes' include: uncertainties on how this data should be protected, by whom it should be protected, whether current state laws safeguard the above data , or the patient where AI is making crucial health related decisions on diagnosis or treatment [13].

Another issue that need to be addressed is in relation to the workforce resistance. Other related concern may be also exist for the healthcare practitioners because introduction of such tools may harm the authority of profession or talented people may be out of job. This resistance can slow the rate of takeoff of AI and this makes it hard to integrate these systems into the current models of delivery of health care. The biggest issue of the absence of interaction between health-care employees of AH such organization involving implementation of AI is the need for additional training [14]. There are, however, many barriers that need to be

surmounted in order to adopt AI in health systems worldwide: Data issues; IT limitations; moral issues; legal issues; and workforce issues. Such barriers will remain critical to the management of if the optimum use of AI is to be realized across the world's healthcare systems.

Ethical considerations in AI for Healthcare and a high-level view of how Ethics and Compliance work in the field of AI

AI solutions delivery in healthcare system serves as a perfect illustrative example of a great opportunity to improve patients' experience and outcomes, increase productivity and organize costs in a reasonable manner. Nonetheless, with social application of AI technologies in their early stages, questions of ethicality, equity and safety arises, and hence, they must be addressed before these solutions are set free into society. Such concern includes data protection and ownership, bias, transparency, and impact on the health care professionals [15]. Thus ethical and legal requirements are beneficial to meet AI in a way that strengthens cords, equity, and safety of patients.

Data Privacy and Security: Most certainly, one of the most significant ethical challenges implemented with the use of AI in health care involves data privacy and security. AI systems depend on patient's data including but not limited to; medical history, Genetic, and Imaging data making them go with substantial data of such kinds. Information is of sensitive nature thus if divulged or processed in the wrong way the effects on the clients will be disastrous. Since the basic components of the AI systems entail cloud storage and other third party solutions for data processing, the problems of unethical intrusions, cyber criminality, and data theft are most likely to persist. In most countries, health information enjoys high privacy laws such as HIPAA in America or the GDPR in the European Union [16]. But these laws may not necessarily be sufficient to address concerns relating to AI based data processing, let alone at a time when data processed is transnational and often implicating multiple parties. From the foregoing, the developers of AI applications should guarantee that encryption, anonymization, and access control mechanisms into their application are done in ways that safeguard the rights of the patient.

Bias and Discrimination: Another area where a huge amount of ethical concern can be posed is the aspect of Discrimination in the Algorithm. AI systems stem from experience and if the training data used to develop these systems are biased then naturally the AI result will be bias and will in fact bolster and magnify current disparity in health care. For instance, when the AI model worked on data of one race, age or gender, and then another race, age or gender, it was wrong on a diagnosis of a disease or even equality in healthcare [17]. In healthcare this can have obvious connotations, especially in the conditions which signs suggest that early diagnosis of the condition or disease is called for. For example, it has been found that different investigations revealing discrepancies in the effectiveness of the AI diagnostics of skin cancer; although it turns out that the general effectiveness of the systems is only slightly lower in people with dark skin because datasets are not evenly distributed. Such misperceptions can only be ruled out with a gradual approach where the right data for training the artificial intelligence systems is provided; the bias of the provided data can be checked now and then; and the search for the better tool that can perform well on all the demography continues [18].

Accountability and Liability: A consequence of course is medical decisions made through the use of AI and there are issues of responsibility in play. Many a time, the application of AI technologies is in line with the goal of supplementing or simply complementing decision-making functions. However, if there are mistakes in the algorithms used in the AI systems, that is, when the system provides inefficient advice or make mistakes such as wrong diagnosis or bad advice on the treatment to give to a patient then who is to blame? Who is at fault: Is it the developer of the AI algorithm or the healthcare provider being involved in the treatment process operating under the help of the AI tool? At times, it is classified as non-transparent, and people cannot understand why a particular decision was made in order to identify the error and the party responsible or to be awarded the error-free outcome [19]. Therefore there is a scenario to provide certain guidelines regarding accountability of both – punitive measures and utilization of practitioners as well as technology in terms of rules regarding identification of the Legal provisions for every patient's rights and agencies for the enforcement of implementation of the rights [20].

Transparency and Explain ability: These observations are also consistent with explanations regarding why explain ability and transparency are core concepts important for creating credible AI solutions in the context of healthcare delivery. Several AI algorithms employ most of the deep learning models to be referred to as black boxes since there is a way they make some decisions and the user cannot easily comprehend how the decision was arrived at. In healthcare, mostly, wherein the mode of treatment is at stake and in any decision in which the life of a particular patient may change, it is mandatory to know how the AI software arrived at a certain conclusion. Instead they may be perceived as daunting or downright hostile and this would deprive the application of

popularity by patients [21]. Ensuring that it is possible to explain to users of an AI system how the system came to the decisions that it did is central to the ability to build trust and to be able to make the proper steps in health care professions and to allow patents to be able to make the correct decision based on the information they are being provided with [22].

Regulatory Oversight and Compliance: This article also provides information about the fact that supervisory and compliance measures are some of the fundamental areas of ethical implementation of AI. One of the most highly regulated industries is the healthcare sector, and therefore any new technology that emerges will always have to go through several tiers when the issue of adoption arises. Thus, the US Food and Drug Administration FDA, the European Medicines Agency EMA, and other national and international bodies required to approve, regulate clinical practice of AI equipment and systems for adherence to set safety, efficacy, and quality standards [23]. These agencies must discover a way of assessing these peculiar technologies which may mean developing policies and processes in the testing phase, clinical trial phase and post marketing surveillance. Moreover, one should differentiate between Application and the Technology: AI will enter the life of people, change industries, organizations, societies; people need the AI technology to become a standard and act in unison to reach the harmony where the AI technologies developed in one country can be safely implemented into the use in other countries. This is more so given the expansion of many kinds of health care delivery systems almost all over this world [24].

The technological-three ethical and regulatory concerns for the application of Artificial Intelligence in the health-care setting are as follows. Therefore, when applying the AI that preserves the patient's data satisfaction of organizational equity for stakeholders, being responsible to the AI and making the AI transparent for enhanced healthcare outcomes is crucial. In addition, the achievement of the purposes co-cooperation as discussed above will call for the improvement and or establishment of high efficiency suppressive systems that will ensure the safety of the AI technologies [25]. The problem is, therefore, where these challenges are going to be met by the policymakers, the healthcare professionals and the technologists as AI continues towards an increased complex value in the healthcare systems of the world.

AI in the Future and development direction of AI in the Healthcare System

Over the coming decade of 2020 Artificial Intelligence is poised to expand enormously on healthcare with Advance in health diagnosis, treatment, Management and care of patient. It is obvious that there is a great potential in future development and use of artificial intelligence in healthcare around the globe but naturally some certain questions arise. The prospects are in the focus on potential opportunities of turning to AI to meet novel social needs in the sphere of health care and medicine and in the disclosure of the familiarity with the advantages and/or vices of universal artificial intelligence technology. This section analyses possible future advances in AI healthcare application to guide the direction to realizing the optimum potential of AI in the healthcare industry globally [26].

Integration of AI with Emerging Technologies: There is another direction through which the preoccupation with the future of AI is more apparent and it is in the form of interaction between AI and the following technologies today; Internet of Medical Things, block chain and sophisticated robotics. AI can be applied to IoMT devices to serve its purpose of enhancing real time monitoring, analysis and offering information. For example, intelligent health gases used on the body that has AI capabilities can take critical signs regularly and notify the health care professionals if there is something wrong, in other words, early prevention can be done [27]. The integration of the block chain with the application of AI will help secure the patient's data while at the same time making the sharing of the data across many provider of health care because it is not centralized.

Moreover, mixing AI with robotic surgery is in the process of revolutionizing the surgery and rehab procedures. They admit that if artificial intelligent robots are introduced into the system it can perform some of the most complicated surgeries with high accuracy hence increasing the results as opposed to having Doing so would mitigate instances of human error that prevail most of the surgeries. Mechanical systems can learn from one procedure to another with the help of artificial intelligence and make incrementally better ways of doing surgery, resulting in surer, less invasive, and lower risk operations [28].

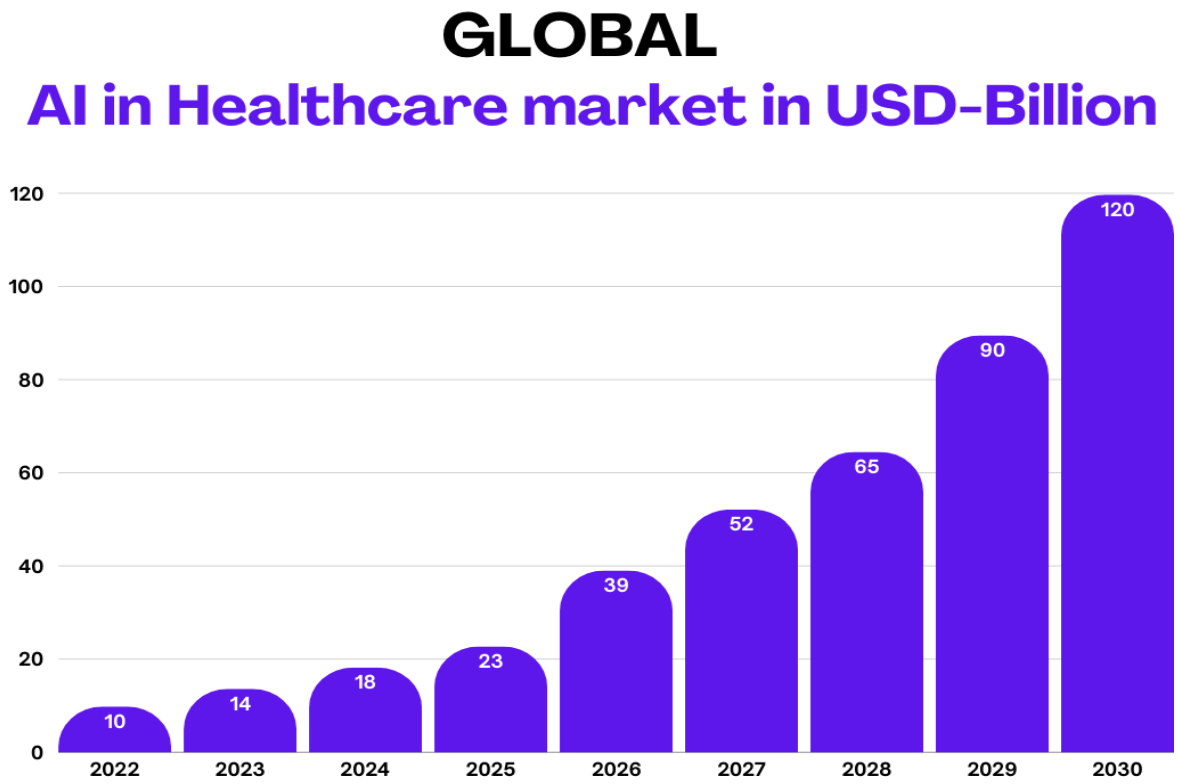

Figure:3 showing global AI in healthcare market

AI in Cardiac Care: Strengths and weaknesses: AI with respect to the cardiac health and arrhythmia have potential strength and weaknesses: Smart clothing with integrated AI allow the heart to be monitored in real time and for detecting the flaws in the heart's rhythm and beats. This has an implication of increased diagnosis, improved client health and reduction in working visits to obtain a diagnosis [29]. In particular, deep learning models have also shown the ability to detect and predict all types of arrhythmias, in the presence of the appropriate treatment measures and introduce new approaches to treatment plans. However, challenges remain. This also becomes a problem of data privacy and security because health information of people is considered to be both communicated and stored. Another impact which arises as a consequence of implementation of the project is the issue of adherence to other rigorous policies and laws in the healthcare sector like the HIPAA or GDPR. One problem is that the bias is seen may be due to Lack of diverse datasets used in training the AI algorithm; in the long run, the AI system will actually wrongfully diagnose those from the minority [30]. Additionally, there is a requirement for a discontinuity and therefore an increased infrastructural development coupled with investment along with up-training of the health care providers in order to incorporate AI into their practices in a secure manner.

Personalization and Precision Medicine: One of the biggest emerging opportunities with AI is passive and active individualized and precision medicine that would be future-dependent. For this reason, by considering the formations of large data about genetics, clinical and environmental data it develops some substrates individual patients that are useful for estimating the way that they would respond towards certain treatments. This kind of individualized approach may completely revolutionize the treatment of chronic diseases, cancers and rare diseases, and all patients will receive the best treatment with the fewest side effects and the best outcomes [31]. For example, the techniques based on artificial intelligence in the analysis of genomic data are actively used today to identify the mutations of cells that lead to the development of cancer and thereby make it possible to develop individual therapeutic methods for the patient. This transfer from the standardized method to a customized approach is beneficial to healthcare management and delivery in a big way. If AI can pick out recurring data that relate with a specific patient then it means that the doctors can always come up with dynamic scrub treatment plans that vary with time and information on the particular patient. This move could be changed from a mode that responds to a fact after it has happened to a mode that constantly anticipates information and avert misfortunes or the creation of additional trouble [32].

Expansion of AI in Global Health Systems: Another reason that will decide AI's future in healthcare will be to minimize the healthcare disparities. Some of the presented current global healthcare challenges which affect systems especially in LMICs

include; inadequate professional human resource, relevant infrastructure and in general constraints in resources. AI can help to filter down those gaps because it provides the cheap solutions that can tackle the health problems of the masses [33]. For example distant image diagnosis applications that rely on artificial intelligence for instance the applications that support distant image diagnosis can be of help to the heath givers in the rural health centers since diagnosis of such conditions may require higher expertise. These have the potential of diagnosing these diseases at an early stage for instance malaria, Tuberculosis and diabetes and eliminate a lot of preventable deaths in our remote areas where practitioners are scarce.

Health informatics enables preventative and curative care engagement in the resource-constrained region through easing of health care administrative work some of which include an appointment calendar, continuing inventory, and accounts receivables. Understanding this in the concept of studying on this subject, one fathoms that when reducing time and energy that is crucial for administrative tasks, then AI improves the quality and service that healthcare professionals in this area provide. This is anticipated to be the show especially given increased use of e-health solutions in more nations and the critical role that is expected to be played by AI in boosting health and health systems in every part of the globe [34].

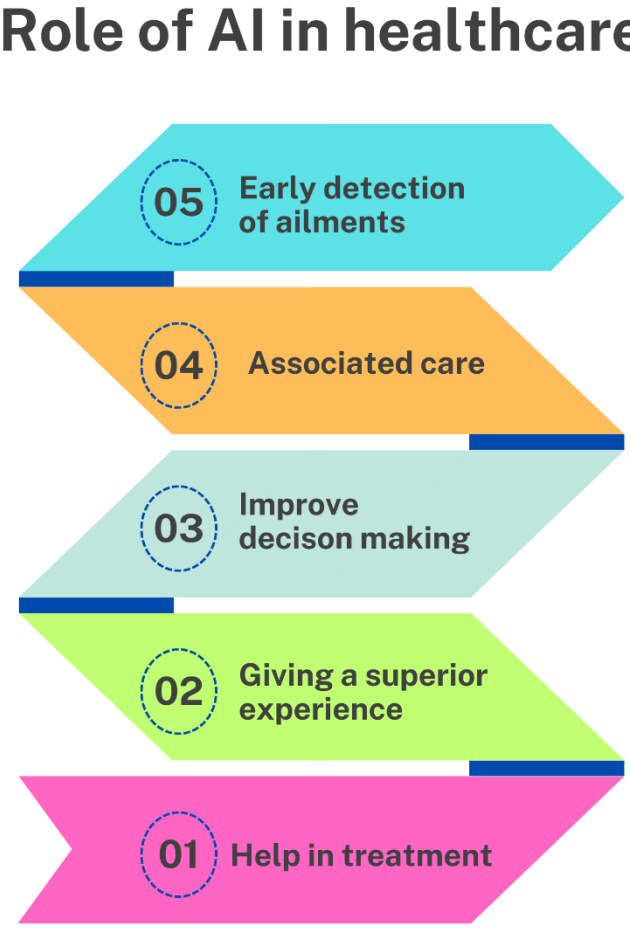

Figure: 4 showing Ai in healthcare

Ethical and Regulatory Frameworks: Artificial intelligence is progressively being incorporated into healthcare systems with that direction it should be regulated properly. It is going to continue to rest with the regulatory authorities to Assess safety and evaluation of such AI tools over time, as the pace of advancement in the deployment of artificial intelligence technologies has been identified to be in an exponential growth. Increased clarity and consistency of global rules and regulation statements is going to be important for large scale international standardization of AI technologies suggesting right use of AI for patient's advantage [35]. Among the basic actions which have to be taken in order to enable trust in AI healthcare applications certain measures can be named – the problem of bias, transparency and accountability has to be solved. AI systems should be evaluated for fairness as often as possible, while the actions of AI should always be comprehensible. These actions will help to prevent that AI could become a yielding to inequalities in the health care system and promote its equal distribution [36].**AI in Healthcare and Cybersecurity:**

Predictably, the development of new AI approaches to healthcare and technology security has occurred relatively quickly, indicating that AI may very soon become the link between these two fields. Lemoine submits that in healthcare, artificial intelligence's most critical area is cardiac care where more intelligent monitoring will be made possible by real-time data obtained from wearable devices [37]. Machine learning algorithms such as deep learning will further improve the diagnosis and therapeutic management of arrhythmias for early diagnosis, and personalized treatment. In the future, it should be expected that having considered all the aspects, such a system will be fully predictive, will be able to consider potential threats to health and will give recommendations for action for each citizen [38].

Collaboration between AI Developers and Healthcare Professionals

I think one of the must-have elements for AI to remain an ongoing process within the healthcare context is the engagement between the developers of AI and health care employees. This also stipulated that, as the AI technologies advances in future it will require integration with clinical processes, there will always be a need for partnerships between those who will be implementing these technologies in health care setting with those who will be developing these technologies with the health care field in mind [39]. The lion share will also be taken by the health care providers' training in the application of AI will also play a massive role in ensuring that those implementing the AI know more is now in action rather than done away with man's wisdom. Additionally, the idea of synergy is work will foster innovation, and the development of more solutions tailored to meet the needs of healthcare professionals. The challenge will be pressing as AI gradually enters day-to-day precise clinical work, and much more feedback is expected from medical practitioners on these intelligent systems to adapt in clinical practice professions [40].

The next twenty years AI has much more in store in improving the healthcare systems across the world. In the future where the AI is more developed further, new applications integrated with the technologies and technologies correlated to personalized medicine as well as global health approaches will develop new post- possibilities and new paradigms to solve numerous issues that have long been in the healthcare field [41]. However, such developments should be done bearing in mind the ethical issues, legislation and collaboration between developers and care practitioners. Using above mentioned challenges AI can redesign HC systems all-around the world thus guaranteeing the, efficient, patient-centered model of the work in the following years.

Conclusion

In healthcare, artificial intelligence (AI) is an exciting area of emerging possibilities on one hand and a complex challenge on the other. Compared to conventional techniques, AI application to healthcare is promising cause for spectacular advances in accurate diagnosis and tailor-made treatments, for improvement of operation efficiency and prognostication of work. However, with the use of AI becoming more prominent across different industries, there are also various issues that need to be considered in details: data protection issues, bias, legal needs, and flexibility of people, and how they play into these algorithms. Al still progresses and thus the integration of AI into any system should be carried out in a proper way to ensure that it does not cause any harm and or the probability of coming up with harm is eradicated. However, there is much positive potential for AI in international healthcare in the future, particularly as regards to the continued rise in pressures faced by the overall health care systems all over the world. With potential of AI integrated with other new technologies including IoMTs and block chain healthcare is very effective, secure and more affordable. It also when applied towards developing of a personalized medicine platform changes treatments as they will be accurate. AI is also anticipated to be present more within international healthcare systems and contribute solutions which would be affordable for the populations that are still in the dark across the world especially in the third world countries.

However, several issues have been observed to have acted as barriers to the optimization of the concept AI as follows: Firstly, there is the need to improve the legal frameworks that support AI secondly, there is the issue of fairness and explain ability of data and thirdly there is the need to reach a convergence between the developers of the AI and the care givers in the health sector. In several ways, it means that ethical concerns for the privacy, accountability and the concern for bias, must be put forward and debated ad infinitum before AI technologies can improve the quality of healthcare for patients instead of excluding the patients in need from accessing it further. As a subject and an application area of AI, what the future of AI in healthcare shall be thus has to be characterized by partnership and being answerable. Each of these stakeholders need to sensibly coordinate their efforts to build models for using artificial intelligence for positive and equitable uses. In this way AI has a great opportunity to put an end to many problems within the healthcare industry and to improve the system all across the globe; to bring high quality care to those who really need it, starting with creating personalized treatment for every single person.

References

1. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. Public Health Rep. 2003; 118:358–65. https://doi.org/10.1093/phr/118.4.358.
2. Minkler M, Wallerstein N. Community-based participatory research for health: From process to outcomes. John Wiley & Sons; 2011
3. Haibe-Kains B, Adam GA, Hosny A, Khodakarami F, Massive Analysis Quality Control (MAQC) Society Board of Directors, Waldron L, et al. Transparency and reproducibility in artifcial intelligence. Nature. 2020. p. E14–6
4. Buolamwini J, Gebru T. Gender shades: Intersectional accu- racy disparities in commercial gender classifcation. In: Frie- dler SA, Wilson C, editors. Proceedings of the 1st conference on fairness, accountability and transparency. PMLR; 2018. p. 77–91
5. Finlayson SG, Subbaswamy A, Singh K, Bowers J, Kupke A, Zittrain J, et al. The clinician and dataset shift in artifcial intel- ligence. N Engl J Med. 2021; 385:283–6. https://doi.org/10.1056/NEJMc2104626.
6. Feng J, Phillips RV, Malenica I, Bishara A, Hubbard AE, Celi LA, et al. Clinical artifcial intelligence quality improvement: Towards continual monitoring and updating of AI algorithms in healthcare. npj Digit Med. 2022. https://doi.org/10.1038/s41746-022-00611-y.
7. Cummings ML. Automation bias in intelligent time critical deci- sion support systems. Decision making in aviation Routledge. 2004. https://doi.org/10.2514/6.2004-6313.
8. Coulter A, Collins A. making shared decision-making a reality: No decision about me, without me. London: The King's Fund; 2011; 621. Japanese Journal of Radiology (2024) 42:3–15 15 1 3
9. Vayena E, Blasimme A, Cohen IG. Machine learning in medi- cine: addressing ethical challenges. PLOS Med. 2018. https://doi.org/10.1371/journal.pmed.1002689.
10. Price WN 2nd, Cohen IG. Privacy in the age of medical big data. Nat Med. 2019; 25:37–43. https://doi.org/10.1038/s41591-018-0272-7. 96. Grady C. Enduring and emerging challenges of informed consent. N Engl J Med. 2015; 372:2172. https://doi.org/10.1056/NEJMc1503813
11. Emanuel EJ, Wendler D, Grady C. What makes clinical research ethical? JAMA. 2000; 283:2701–11. https://doi.org/10.1001/jama.283.20.2701
12. Abouelmehdi K, Beni-Hessane A, Khalouf H. Big healthcare data: Preserving security and privacy. J Big Data. 2018; 5:1–18. https://doi.org/10.1186/s40537-017-0110-7.
13. Taylor L, Floridi L, van der Sloot B. Group privacy: New chal- lenges of data technologies. Springer; 2016 100. Neri E, Coppola F, Miele V, Bibbolino C, Grassi R. Artifcial intelligence: who is responsible for the diagnosis? Radiol Med. 2020; 125:517–21. https://doi.org/10.1007/s11547-020-01135-9.
14. Price WN 2nd, Gerke S, Cohen IG. Potential liability for phy- sicians using artifcial intelligence. JAMA. 2019; 322:1765–6. https://doi.org/10.1001/jama.2019.15064.
15. Van der Velden BHM, Kuijf HJ, Gilhuijs KGA, Viergever MA. Explainable artifcial intelligence (XAI) in deep learning-based medical image analysis. Med Image Anal. 2022. https://doi.org/10.1016/j.media.2022.102470.
16. Goebel R, Chander A, Holzinger K, Lecue F, Akata Z, Stumpf S, et al. Explainable AI: The new 42? Machine Learning and Knowledge Extraction. Springer International Publishing. 2018; 295–303. https://doi.org/10.1007/978-3-319-99740-7_21
17. Gilpin LH, Bau D, Yuan BZ, Bajwa A, Specter M, Kagal L. Explaining explanations: An overview of interpretability of machine learning [Internet]; 2018. cs.AI. http://arxiv.org/abs/ 1806.00069. https://doi.org/10.1109/DSAA.2018.00018
18. Rudin C. Stop explaining Black box machine learning models for high stakes decisions and use interpretable models instead. Nat Mach Intell. 2019; 1:206–15. https://doi.org/10.1038/s42256019-0048-x
19. Miller T. Explanation in artifcial intelligence: Insights from the social sciences. Artif Intell. 2019; 267:1–38. https://doi.org/10. 1016/j.artint.2018.07.007.
20. Lipton ZC. The mythos of model interpretability. In: machine learning, the concept of interpretability is both important and slippery. Queueing Syst. 2018. Association for Computing Machinery; 16:31–57. https://doi.org/10.1145/3236386.3241340
21. Topol EJ. High-performance medicine: The convergence of human and artifcial intelligence. Nat Med. 2019; 25:44–56. https://doi.org/10.1038/s41591-018-0300-7
22. Rajkomar A, Dean J, Kohane I. Machine learning in medicine. N Engl J Med. 2019; 380:1347–58. https://doi.org/10.1056/NEJMr a1814259.

23. Obermeyer Z, Emanuel EJ. Predicting the future - Big data, machine learning, and clinical medicine. N Engl J Med. 2016; 375:1216–9. https://doi.org/10.1056/NEJMp1606181
24. Yasaka K, Akai H, Kunimatsu A, Kiryu S, Abe O. Deep learning with convolutional neural network in radiology. Jpn J Radiol. 2018; 36:257–72. https://doi.org/10.1007/s11604-018-0726-3.
25. Burrell J. How the machine "thinks": Understanding opacity in machine learning algorithms. Big Data Soc. 2016; 3:2053951715622512. SAGE Publications Ltd;3. https://doi.org/10.1177/2053951715622512
26. Char DS, Shah NH, and Magnus D. Implementing machine learning in health care - Addressing ethical challenges. N Engl J Med. 2018; 378:981–3. https://doi.org/10.1056/NEJMp1714229.
27. Morley J, Machado CCV, Burr C, Cowls J, Joshi I, Taddeo M, et al. The ethics of AI in health care: a mapping review. Soc Sci Med. 2020. https://doi.org/10.1016/j.socscimed.2020.113172
28. Epstein RM, Fiscella K, Lesser CS, Stange KC. Why the nation needs a policy push on patient-centered health care. Health Af (Millwood). 2010; 29:1489–95. https://doi.org/10.1377/hlthaf.2009.0888
29. Zainab, H., Khan, A. H., Khan, R., & Hussain, H. K. (2024). Integration of AI and Wearable Devices for Continuous Cardiac Health Monitoring. *International Journal of Multidisciplinary Sciences and Arts*, *3*(4), 123-139.
30. Khan, A. H., Zainab, H., Khan, R., & Hussain, H. K. (2024). Deep Learning in the Diagnosis and Management of Arrhythmias. *Journal of Social Research*, *4*(1).
31. Barredo Arrieta A, Díaz-Rodríguez N, Del Ser J, Bennetot A, Tabik S, Barbado A, et al. Explainable artifcial intelligence (XAI): concepts, taxonomies, opportunities and challenges toward responsible AI. Inf Fusion. 2020; 58:82–115. https://doi.org/10.1016/j.infus.2019.12.012
32. Vayena E, Dzenowagis J, Brownstein JS, Sheikh A. Policy impli- cations of big data in the health sector. Bull World Health Organ. 2018; 96:66–8. https://doi.org/10.2471/BLT.17.197426.
33. Mittelstadt BD, Floridi L. The ethics of big data: current and foreseeable issues in biomedical contexts. Sci Eng Ethics. 2016; 22:303–41. https://doi.org/10.1007/s11948-015-9652-2.
34. Coulter A, Ellins J. Efectiveness of strategies for informing, educating, and involving patients. BMJ. 2007; 335:24–7. https://doi.org/10.1136/bmj.39246.581169.80.
35. Open AI. GPT-4 technical report [Internet]. arXiv [cs.CL]; 2023. http://arxiv.org/abs/2303.08774
36. Eloundou T, Manning S, Mishkin P, Rock D. GPTs are GPTs: An early look at the labor market impact potential of large language models [Internet]. arXiv; 2023. econ.GN. http://arxiv.org/abs/2303.10130
37. Ueda D, Walston SL, Matsumoto T, Deguchi R, Tatekawa H, Miki Y. Evaluating GPT-4-based ChatGPT's clinical potential on the NEJM quiz [Internet]; 2023. medRxiv. https://www.medrxiv.org/content/10.1101/2023.05.04.23289493v1
38. Davis MA, Lim N, Jordan J, Yee J, Gichoya JW, Lee R. Imaging artifcial intelligence: A framework for radiologists to address health equity, from the AJR special series on DEI. AJR Am J Roentgenol. 2023. American Roentgen Ray Society. https://doi.org/10.2214/AJR.22.28802
39. Khan, M. I., Arif, A., & Khan, A. R. A. (2024). The Most Recent Advances and Uses of AI in Cybersecurity. *BULLET: Jurnal Multidisiplin Ilmu*, *3*(4), 566-578.
40. Khan, M. I., Arif, A., & Khan, A. R. A. (2024). AI-Driven Threat Detection: A Brief Overview of AI Techniques in Cybersecurity. *BIN: Bulletin Of Informatics*, *2*(2), 248-261.
41. Shimazaki A, Ueda D, Choppin A, Yamamoto A, Honjo T, Shimahara Y, et al. Deep learning-based algorithm for lung cancer detection on chest radiographs using the segmenta- tion method. Sci Rep. 2022; 12:727. https://doi.org/10.1038/s41598-021-04667-w.