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Promise and Pitfalls of AI in Healthcare: A Critical Review

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ABSTRACT

AI is already becoming a disruptive technology in healthcare in so far as this can be explored as a means for improving diagnosis, individualizing treatment, improving operational output and quickly determining new treatments. Some of the concentrations as part of AI that is today creating impressive effects across diverse healthcare sectors include; machine learning and natural language processing as well as computer vision in medical imaging, clinical support, and operation. The above innovations have viable capacity to offer enhanced value delivery, cost efficiencies, and better organizational performance for the patients. However, there is a considerable cost for adopting AI in the health care system which undoubtedly has the following disadvantages: data protection, algorithms, openness, responsibility. If bioethics AI practitioners do not take time and think through the many consequential ethical concerns related to anatomical artificial intelligence, the viewer's cannot get an experience that is similar to that of the virtual superintendents. Thus the nature of the interaction will become more important into the future while the interaction will be based on the further evolution of algorithms then introduction of AI in precise medicine, and better receptors for safety and for fairness of the algorithm. Besides applying the explained AI methods, a significant level of IT training of healthcare professionals is also required; also, the patients themselves should be told about the advantages and disadvantages of the employed AI techniques. This review discusses strengths and weaknesses of applying AI processes in health care, problems in this sphere and tendencies of AI's further development about seeing the integration in health-care systems. The future of applying the AI in international healthcare will therefore call for increased collaboration among researcher, policy makers and clinicians for the implementation to commence.

INTRODUCTION

Present at this time as a phenomenon in the healthcare organization, absorbs quickly and is looking into becoming the decisive factor in delivering of care to the patients and organizational outcome besides supporting sciences for precision medicine. In particular AI operates in the area of computer science as a method of replicating human intelligence in machines designed for thinking and learning as well as [1]. Strategy and problem solving activities understood to require human input. Sophisticated technologies including ML, NLP and CV are examples of what is widely known as AI that has a potential to transform the healthcare sector. AI has been introduced in the healthcare systems because of the need to improve the solutions of many healthcare issues. The health care field has become AI-rich as the cost of health care has sharply risen due to the aging population and the massive amount of information. For example, where a diagnostic tool employing artificial intelligence to examine various forms of scans is much more effective and precise than a human being in issue such as, cancer identification or cardiovascular and neurologic sicknesses [2]. Come, the AI algorithms allow to analyze many parameters concerning patients that provide clinicians the ability to make perfect recommendations concerning further therapy.

In like manner, SI has the potential of worsening the adverse effects of diagnostic accuracy, support secretarial tasks, optimize operations, and reduce the tasks imposed on the healthcare practice. In so doing, AI provides the providers with the chance of focusing on undertaking superior tasks that are related to care. Another value, in additional, has occurred as AI put more to work in drug discovery from hub development that aids the identification of new treatments, decreases time and costs of clinical trials [3]. However, issues arise whenever people introduce AI in different industries, including healthcare as well. This activity implies working with a tremendous amount of data; therefore, the problem of data privacy and security. However, bias in the AI decision making process, and need for the AI system to be ethical and therefore accountable or explainable is all ethical. As a result of this, the following questions are useful questions to ask as the healthcare sector shifts forward to getting the best out of AI arguing for both the strengths and weaknesses of these technologies for the benefits of making positive impacts in the lives of patient, clinicians, and healthcare systems at large [4].

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PROMISES OF AI IN HEALTHCARE: BENEFITS AND INNOVATIONS

AI has many advantages regarding the future of healthcare and the quality and standards of patients' care in the future. A feature of AI that makes tens of thousands of superheroes is its ability to process large amounts of data and produce differentiated analytical data at the same time, this is the strength which put AI at the center stage of contemporary medicine. AI was expected to be the most suitable technology to increase the diagnostic accuracy. Diagnostic imaging which forms part of a comprehensive healthcare solution is a sector that may significantly benefit from deep learning and computer vision [5]. The AI algorithms may be higher than odder human radiologists in identifying the medical images such as radiographs, MRI, and CTs. For instance, it was discovered that through a analysis of imaging data that seems to be extremely hard to detect with human naked eye by clinicians, AI systems can reach to the right diagnosis of diseases like cancer, cardiovascular diseases and Neurological disorders. And in majority of instances such improvements of accuracy needed for diagnostics not only reduce the possibility of potential human mistake that is always present in any assessment, but also allow starting treatment earlier, which always produces significantly higher patients' outlook [6].

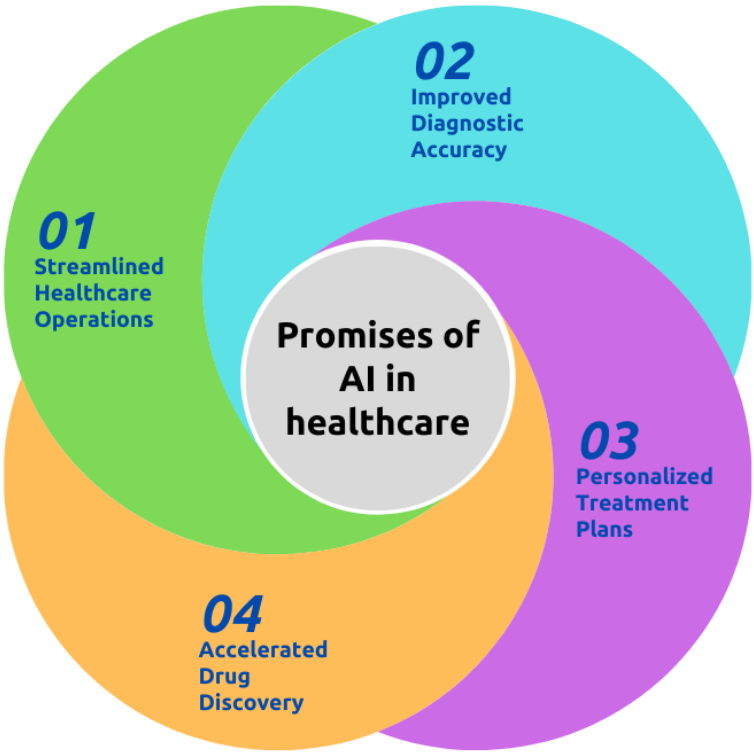


Figure: 1 showing promises of Ai in healthcare

Similarly, at AI it is also possible to envision the potential of developing individualized treatment plans based on the patient's information. In a similar manner, based on assignable factors such as the medical history, genetic code, and other characteristics, AI systems can also choose the course of treatment a patient suffering from a specific disease should undergo. Particular focus should be required how it helps a doctor in the case of residing multiple chronic illnesses like the diabetes and cardiac diseases, in other words better selection is possible for the correct intervention which would be more effective for the further healing. The idea that the treatments prescribed is based on a patient's needs '' one to one '' treatment is known as a precision medicine and not attending the healthcare center, and offer all same type of treatments to all patients as the conventional model [7]. Similarly to discovery AI is also helping in the development of drugs. What is critical to understand is the fact that the conventional system of drug discovery and development is slow and expensive and most of the candidate drugs end up disappointing at clinical trial. AI can complement this process by predicting how certain compound would behave when engaging with targets in the body and could possibly save time than that which is used in identifying promising drug candidates. Thirdly AI can also sort through the existing literature or clinical data to have more knowledge about the diseases already being treated and how they could be treated. AI is at its best when applied to finding the cure for cancer and other diseases for which new treatments are difficult to identify [8].

It is expected that AI will give an enormous increase in health care procedures. In healthcare, AI holds the capacity of eradicating trivial paper work such as billing, appointment and indeed claims. That way, the healthcare providers spend a lot of time interacting with the patients and also meet the patients' needs; hence negating the HCAHPS score. Opportunities to increase the efficiency of work activities through AI, to predict admissions of patients or optimally allocate resources at schools of health-care facilities can also save money and improve the nodes in general functionality of the health-care system. Another example is worthy of mentioning as to how one more application learned to predict AI – increased accessibility of a healthcare service. It is possible to utilize the AI based on telemedicine in the areas that

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are difficult to access or populated minimally, so that the population will receive competent consultation [9]. Partial patient support is provided here by the application of Artificial Intelligence in the form of chatbots or virtual assistants; these are boot-up, are functional 24/7 and often can educate a patient, as well as deliver him/her general or specific health instructions when the situation is not very critical. It also led to the ability to provide better decisions regarding minor illnesses provided the cliques with the chance to leave serious diseases with proper care. In the health sector the possibilities are the increased accuracy of diagnosis, treatment, a speedier production of new medicines, and better health administrative structures. Nevertheless, the development of AI industry is constant, and this field opens up more opportunities to improve patients' treatment and the sphere of healthcare [10].

CHALLENGES AND PITFALLS: RISKS AND ETHICAL CONCERNS

On one hand, the theory of utilizing Artificial Intelligence in the field of medical care has a lot of potential and a potential that has not been revealed yet. Such difficulties involve technical ones only up to the variations in places and patient's identity, data security, and bias of an AI model. These risks must therefore be understood and the chance of them occurring minimized as much as possible to ensure that our patients are able to receive fair, safe and efficient health care services in what is becoming an increasingly AI dependent fiea ld of health care [11]. In terms of the use of AI in healthcare one of the most significant questions is associated with data protection subject. AI depends on data; and health care data, especially, requires a vast quantity of data and extremely sensitive at that. Such data include: The patient's previous illness, current gene, body parts pictures, previous treatments, etc. Nonetheless, such data is valuable for training AI algorithms and, at the same time augments the prospects for breaches and misuse [12]. Consequently, where hackers are targeting healthcare institutions, they are able to acquire considerable and personal information including an individual's name together with his or her medical information in specific, though such data if used for malicious purposes would lead to identity theft, fraud, severe emphasis on the former as may be lethal. There are responsibilities such as HIPAA in the United States that attempt to govern protecting patient's information but AI continues to advance at this than regulations. One of the biggest obstacles is to ensure that the AI systems can be made pass-proof and are conforming to the privacy levels [13].

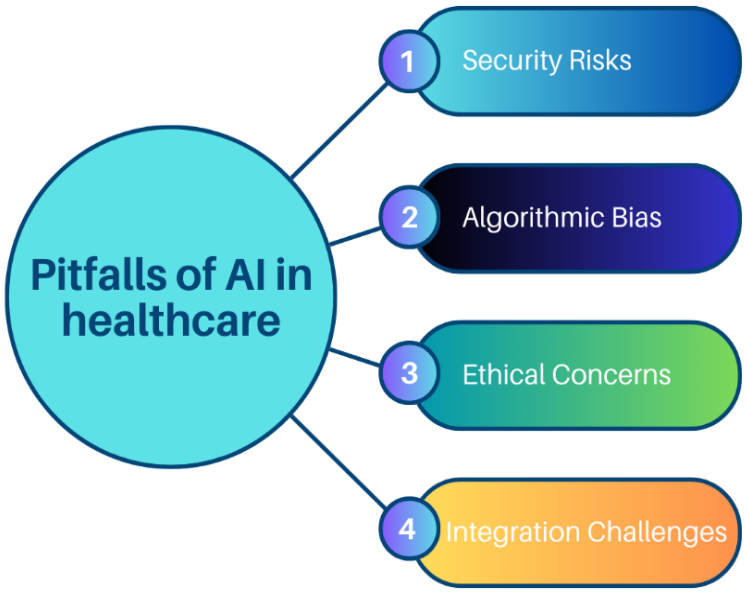


Figure: 2 showing pitfalls of AI in healthcare

As seen in the Industrial Use of AI for wind turbine control and cardiovascular tracking there are large benefits but also large drawbacks and ethical dilemmas. Some of these challenges include; obtaining accurate data is very sensitive to wind energy since improper data will resource the system, and cybersecurity threats makes the energy system penetrable. AI deployment requires high cost and has added disadvantage of yielding energy consumption when computations shift to AI. Also in healthcare, there appear risky issues including, privacy of patients' information, biased algorithms that leads to biased results, and complete reliance on AI systems [14]. Of course, access disadvantages within both energy and healthcare will remain and revolve around the ethical issues, demanding high levels of ethicality married with the right accurate and diverse data for the potential harms to be avoided fully unlocking the benefits of AI.

Another problem was that of bias within the algorithm. This database on which such models are designed will not be complete in some facets, or it will contain stereotype or bias, and if AI healthcares is to use such data to design models, it is ready to perpetuate such imbalance. For instance, when the AI system is trained with data from one type of patients it then means that the system will not be very efficient in diagnosing or even treating patients from other categories like

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the black minority or patients with certain diseases [15]. This may lead to wrong identification; inadequate management or even real harm to these individuals particularly the ones in the special categories. Preventing algorithmic bias entails stressing the importance of the datasets within which the algorithms are trained and ensuring widespread use of diversified dataset [16].

The last important issue presented is related to transparency and accountability of decision-making in the AI environment. Almost all or all the AI systems include deep learning models, and these are non-interpretable models referred to in the literature as black box models. This is not ideal in health care and not good for the patient because the human clinician has to adhere to specific decision and for him or her to be able do this, he or she needs reasoning why a certain direction or recommendation or diagnosis was arrived at. Basically, clinicians and/or patients fail to accept outputs where they do not understand the intermediate steps leading to that conclusion. There is no way to know where an error originates or even attribute a mistake to anyone [17]. This generates so much of uncertainty over who, between the RN and the AI platform, will be held liable or be held responsible in the event that_CODES_ misdiagnosis or delayed treatment emanates from the AI platform suggestions. This explain why those processed patterns must in the first instance be explainable, auditable and accountable so that consumers have confidence in the systems.



Figure: 3 showing challenges and solutions of Ai in healthcare

The other challenging endeavor is integration of the AI into the present healthcare systems. AI has lots of issues when being implemented and health care is an active field with a vast area of outreach. Usually, a high number of healthcare institutions, particularly in the developing world, are associated with numerous problems of outdated technology platforms that constitute a threat to the adoption of AI solutions. Local resistance originating from healthcare professionals may therefore slow down the change process even though change is taking place at a faster pace at the technical areas because the professionals may be nervous or new to the innovative AI technology [18]. However, knowledge and training are necessary to enable the providers to be able to ask AI to do those things that the implementation of AI is doing instead of work them into the wings of AI. The legal ways and means to apply artificial intelligence in supply of healthcare are compulsory. This new framework of applying AI in decision making may raise concerns on the role and place of the human clinicians in systems of patient care [19].

Handing out crucial health care decisions to machines, most especially when patient is critically ill or bedridden and

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there is need to make decisions on when or if to Nugent, withdrawing life-sustaining treatments: demotic AI; the place of respiratory care may change the classic medical ethic. There have also been questions on the use of AI in enhancing discrimination in delivery of health care since the use of AI technologies in Health care may also be a domain of the knowledgeable, affluent or those in the developed world [20]. AI technologies must be positive and the worthy and positively constructed principles while being constructed to foster no negative implications of this technology on the healthcare systems that protect patients' privacy and equality.

There are many ways in which AI would improve the fact that AI is now leading and will continue to grow in the sphere of healthcare, there are many potential risks and concerns for ethical use of AI [21]. Attending to these concerns from data protection and the fairness of algorithms used to overseeing and ethics of AI is option for healthcare to give this technology a chance of being what its integrations intend it to be. After the AI is getting started in those various fields, proper regulation, critical examination, and further ethical evaluation of the concept will be required as it develops and becomes applied to the health care sector [22].

REAL-WORLD APPLICATIONS OF AI IN HEALTHCARE: CASE STUDIES AND OUTCOMES

This element of application of Artificial Intelligence in health care system is already giving positive outcomes, the real-life examples changing different tenets of this industry. AI is not just a theory anymore but a reality that is implementing changes on the subject area in order to enhance diagnostics, applied treatments, operational system, as well as personalized medicine and research. Four specific fields illustrate how AI has been useful in the health care sector; these are: Medical Imaging Clinical Decision Support; and Drug Discovery. Medical imaging is among the most common areas of healthcare that utilize AI [23]. Deep learning algorithm has demonstrated major improvements in capacity to diagnose diseases from imagery data. For instance, in diagnosing of diseases like breast cancer, lung cancer, and neurological illnesses, using X-rays, CT and MRI scans AI has recorded high efficiency. An example is the creation of the AI models of breast cancer in the early stage detection. There have been a number of papers that demonstrate that AI algorithms can diagnose mammography with the same or even better performance as radiologists. These AI tools are able to pick up details of image and clinical particulars that might be too obscure for clinicians to see and diagnose leading to early patient intervention and better treatment results [24].

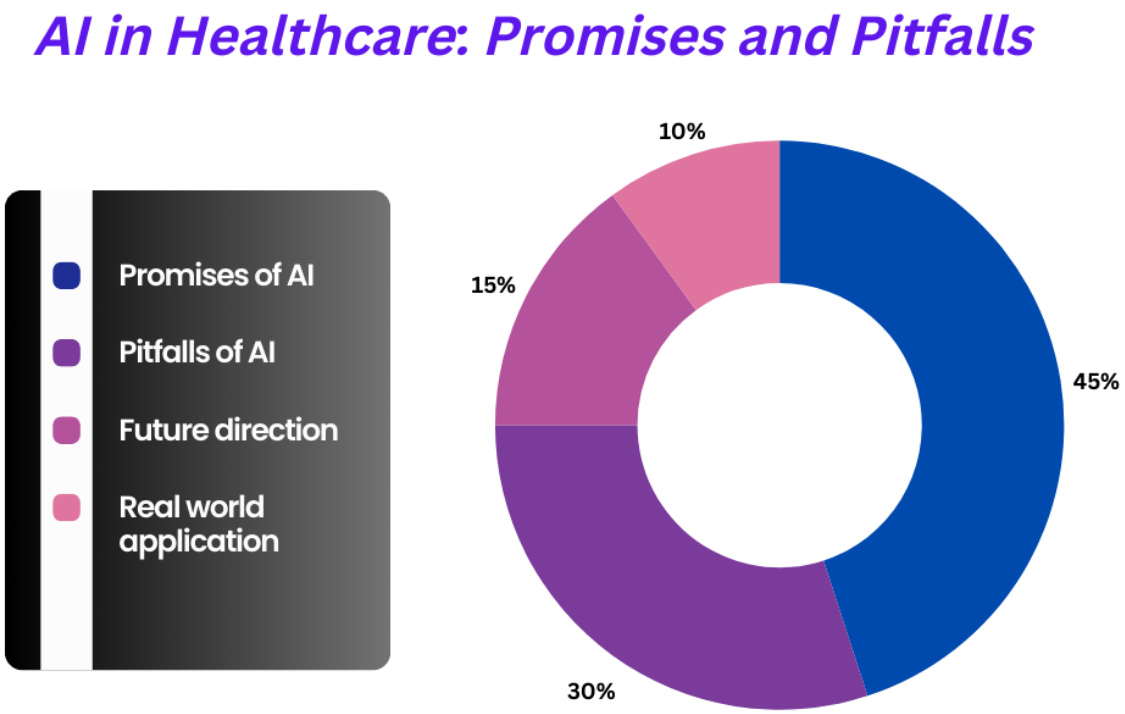


Figure: 4 showing AI in healthcare promises and pitfalls

Within the clinical decision support an AI system is used more and more by health care givers as aide memoires that help in making decisions regarding patients. Technological applications automatic, patient's medical records, health histories, test results, and genetic profiles in order to make specific diagnoses and treatments decisions. For instance, IBM Watson Oncology is an AI platform that assists oncologists in engaging development of precise cancer therapy regimes based on a huge amount of 'big data' clinical and published information [25]. These artificial intelligence systems allow clinicians to present treatment options based on the most recent data available thereby providing improved outcomes and client satisfaction with a reduction of risk based on human error. The use of AI is, however, having a massive impact in the other area of application namely, drug discovery and development. Historically the process of creating new drugs, has been slow and very costly; and it may take several years before new drug can be launched to the market [26]. AI is speeding

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up this process through its ability to anticipate how one compound reacts with another, how it binds to targets in living tissues, and even Rosetta stone sifting through drug trial outcomes. One example of it is Exscientia, the AI-based drug discovery firm, which designed an experimental cancer therapy that went for clinical trials within nine months. Thanks to state-of-the-art algorithms, AI can scan tremendous amounts of data and outline potentially strong compounds to make valuable impacts on the development of new drugs and prevent time and monetary expenditures [27].

AI is also used in the management of healthcare operations activities in order to OPTIMISE on the management of administrative tasks. For instance, in the aspect of operational usage, AI algorithms help in estimating admissions in the hospitals and arrange schedules for staffing. These systems can learn from patient data and predict the number of patients that are expected in the hospital through forecasting; thereby assisting the hospitals to more efficiently plan it's human and material resources, and consequently, have shorter patient waiting time [28]. Moreover, with an upsurge in the number of utilization of artificial intelligent-powered robots such as chatbots and virtual assistants at the front-end, time-consuming tasks like answering simple questions, providing appointment reminders, and post-treatment consultations have been offloaded from healthcare workers. However, as shown by these real-world applications it remains that wide incorporation of AI in the health care sector is yet in its infancy. At least, many systems are still testing or has been gradually implemented in some clinical settings [29]. But what has been achieved so far ranges from detecting cancer at its early stages, tailor made treatments to accelerating the process of developing drugs, all point to the fact that AI has the capacity to revolutionize healthcare delivery in a way that will reduce costs and improve patient outcome. Considering AI as the society's development in the future, its usage in the healthcare system is likely to grow which in turn may improve the healthcare delivery system as well as production of medical research [30].

FUTURE DIRECTIONS: AI'S FUTURE ROLE IN HEALTH SYSTEMS

Artificial Intelligence (AI) in health care is promising and as the technologies continue to grow, they will create the ability to revolutionize medical practice, efficiency, and patients' lives in the future. However, for this concept to be fully implemented, the following critical improvements must be carried out. These changes occur within the technological improvement, the ethical standards and guidelines, policy, as well as learning [31]. To get a glimpse of what is in store for the next few years, healthcare AI will have to make sense of these factors. Another important aspect which should be developed in the future is the development of the AI algorithms and models. Present day A.I. based approaches has high likelihood in the healthcare domain; however, there remains issues in terms of precision, effectiveness, and interpretability of current A.I systems. In the future, there will be the need to enhance the machine learning algorithm since it will have to accommodate for not only various, but also diverse data sets. This is going to be crucial in areas like genomics by which deciphering the genetics of diseases are not easily figured out aside from the need for complex algorithms worked by the AI [32].

Further advances in generative models and their explanation will matter also. The results suggest that clinicians need to learn how AI systems think in order to be able to rely and integrate those tools into clinical practice. The subsequent AI systems will be much more symbolic / interpretational in nature and actually explain to the user why they arrived at a certain conclusion: an explanation that should sound reasonably logical to a person [33]. Another promising area of applying AI is in the coordinated statistic with precision medicine. AI can because of processing big data determine the sort of treatments that should be offered based on one's genes, the other factors including the life they live and the conditions they are exposed to. For instance genetic characteristics discovered in cancer will enable AI to assist clinicians in finding better treatment regimen for a particular patient or at least less sensitive tumors [34]. Moreover, as AI advances, the use of patient individualized clinical judgment to map and recommend the lifetime plan for disease prevention and management for chronic illnesses may be feasible in real-time. Of course, there are certain indications that the fact that the economics that provides only the treatment at the same time but the prevention of illnesses that may take some time is gradually coming through therefore, putting a check on the rising cost of maintaining health in the future [35].

The second area for future research is regulation and governance. It is, therefore, important that as health care organizations increase adoption of AI, the systems used adheres to ethics and legal requirements. Other regulatory authorities and policy makers and even governments will have to come up with complex strategies for other results of more concerns like data protection, bias, responsibility, and openness among others [36]. That is why one of the serious threats that must be courageous during the use of artificial intelligence is to say that tools have been massively tested and have been given a safety certificate. Further, for AI solutions in healthcare there has to be rules that were elaborated to avoid exacerbation of the existing gaps in health care. Mores which will also direct the potential likely hood of the application of AI to favor some group of people or some geographical location as opposed to others will be useful in the development of a fair health care system [37].

The second factor that will also be very important when it comes to implementation of the AI systems into the health care setting is training the members of the health care profession. In the future, providers will not only be expected to have the knowledge and understanding on how the automated system works, but how to engage with it as well. This may try to require that one shift the way towards medical education, where more info is gained about the clinical approach together with the data science and the machine knowledge. Therefore, when it comes to establishing trust with the patients depending on the AI systems there is the need in showcasing the strengths and the weaknesses of the technologies under consideration [38]. In the future there is a lot that can be made in terms of endowing the AI-driven systems to do a health

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check on the population and also great potential in the utilization of telemedicine. Smart clothing and health apps these organizations are already providing patient's real-time tracking of their blood pressure, pulse rate, activity level, and symptoms, and more. This implies that real-time process of this data can enable AI to identify all the medical problems that are coming in early stages and may need attention. This may reduce the hospitalization rates, enhanced management of the chronic illnesses and enable customized patient health care [39]. Additionally, the future of work and consultancy through telemedicine is also set to increase especially in remote and rural areas for cognitive capabilities will improve diagnosis and treatment through consultancies AI, virtual consultations.

Regarding the future, it is impossible to close one's eyes to the future of AI in healthcare as a very perspective area, however, rather sensitive and, in case AI remains under the control of Big Tech, rather exploitative one. AI as an emerging technology and growing its application in the field of healthcare while managing the application of the technology requires offering the proper training programs and appropriate ethical guidelines [40]. As AI technologies are actively being developed for implementation in healthcare, the opportunity to create new efficient, individual, and affordable treatment for the patient all over the world has emerged, thereby creating a new epoch in medicine.

CONCLUSION

Artificial Intelligence (AI) now has incredible opportunities in the sphere of healthcare as it will be able to enhance accuracy of the diagnosis, rise productivity and flexibility of practicing new treatments for every patient, as well as speed up the process of drugs' creation. As advanced in Artificial intelligence it has been demonstrated that the application of AI improves the way patient care is provided in the health sector and reduces the cost and time as well. Some of the originally implemented AI applications in medical imaging, clinical decision support and healthcare operations where they observe positive changes illustrates that it can bring changes to healthcare. But they come with challenges and ethical consideration that are nearly inseparable from this progress. Privacy and security concerns, ways through which algorithms become prejudicial, and how to hold them to account, are impediments to safe use and deployment of AI. These risks may only be minimized if the training data of AI is diverse; AI policies over privacy issues are efficiently enforced. Moreover, to build up the confidence of both the doctors and healthcare centers as well as the patients, there are four things that are of importance, these include the explainable AI as well as the advantages and disadvantages of using the mentioned technologies.

In future the AI in healthcare will be defined by – better algorithms, link between AI and precision medicine and an appropriate regulatory milieu. It is now time to explain how AI enables the reinvention of care, smart chronic disease management, and the future health monitoring system. However, there are concerns on the ethical and feasible application of AI there is no doubt that advancement in AI use in health care will spur partnerships, new strategies, and well educated type of regulation. For rather less, AI technologies predict innovative styles of modifying the structure of health care delivery system with an added bonus of offering world class technologically supported, patient oriented, effective and affordable patient care to all the patients all over the world. If applied constructively and responsibly, AI can be instrumental in ensuing the kind of IT-support to take the health care to the next level with clarity and creativity that would fit the destiny of the society.

REFERENCES

1. Tsamados A, Aggarwal N, Cowls J, Morley J, Roberts H, Tad- deo M, et al. The ethics of algorithms: key problems and solu- tions. AI & Soc. 2022; 37:215–30. https://doi.org/10.1007/s00146-021-01154-8
2. Uematsu T, Nakashima K, Harada TL, Nasu H, Igarashi T. Com- parisons between artifcial intelligence computer-aided detection synthesized mammograms and digital mammograms when used alone and in combination with tomosynthesis images in a virtual screening setting. Jpn J Radiol. 2023; 41:63–70. https://doi.org/10.1007/s11604-022-01327-5.
3. Ueda D, Yamamoto A, Onoda N, Takashima T, Noda S, Kashi- wagi S, et al. Development and validation of a deep learning model for detection of breast cancers in mammography from multi-institutional datasets. PLoS ONE. 2022. https://doi.org/10.1371/journal.pone.0265751
4. Honjo T, Ueda D, Katayama Y, Shimazaki A, Jogo A, Kageyama K, et al. Visual and quantitative evaluation of microcalcifcations in mammograms with deep learning-based super-resolution. Eur J Radiol. 2022. https://doi.org/10.1016/j.ejrad.2022.110433.
5. Ueda D, Yamamoto A, Takashima T, Onoda N, Noda S, Kashiw- agi S, et al. Training, validation, and test of deep learning models for classifcation of receptor expressions in breast cancers from mammograms. JCO Precis Oncol. 2021; 5:543–51. https://doi.org/10.1200/PO.20.00176
6. S. U. Khan, N. Khan, F. U. M. Ullah, M. J. Kim, M. Y. Lee, and S. W. Baik, "Towards intelligent building energy management: AI-based framework for power consumption and generation forecasting," Energy and buildings, vol. 279, p. 112705, 2023.
7. R. Vallabhaneni, S. Pillai, S. A. Vaddadi, S. R. Addula, and B. Ananthan, "Secured web application based on CapsuleNet and OWASP in the cloud," Indonesian Journal of Electrical Engineering and Computer Science, vol. 35, no. 3, pp. 1924-1932, 2024.

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8. Ueda D, Ehara S, Yamamoto A, Iwata S, Abo K, Walston SL, et al. Development and validation of artifcial intelligence-based method for diagnosis of mitral regurgitation from chest radio- graphs. Radiol Artif Intell. 2022. https://doi.org/10.1148/ryai.210221.
9. Ueda D, Yamamoto A, Ehara S, Iwata S, Abo K, Walston SL, et al. Artifcial intelligence-based detection of aortic stenosis from chest radiographs. Eur Heart J Digit Health. 2022; 3:20–8. https://doi.org/10.1093/ehjdh/ztab102.
10. Matsumoto T, Ehara S, Walston SL, Mitsuyama Y, Miki Y, Ueda D. Artifcial intelligence-based detection of atrial fbrillation from chest radiographs. Eur Radiol. 2022; 32:5890–7. https://doi.org/10.1007/s00330-022-08752-0
11. Ueda D, Yamamoto A, Takashima T, Onoda N, Noda S, Kashi- wagi S, et al. Visualizing "featureless" regions on mammograms classifed as invasive ductal carcinomas by a deep learning algo- rithm: the promise of AI support in radiology. Jpn J Radiol. 2021; 39:333–40. https://doi.org/10.1007/s11604-020-01070-9.
12. Ohno Y, Aoyagi K, Arakita K, Doi Y, Kondo M, Banno S, et al. newly developed artifcial intelligence algorithm for COVID-19 pneumonia: Utility of quantitative CT texture analysis for predic- tion of favipiravir treatment efect. Jpn J Radiol. 2022; 40:800–13. https://doi.org/10.1007/s11604-022-01270-5
13. Matsukiyo R, Ohno Y, Matsuyama T, Nagata H, Kimata H, Ito Y, et al. Deep learning-based and hybrid-type iterative recon- structions for CT: Comparison of capability for quantitative and qualitative image quality improvements and small vessel evalu- ation at dynamic CE-abdominal CT with ultra-high and standard resolutions. Jpn J Radiol. 2021; 39:186–97. https://doi.org/10.1007/s11604-020-01045-w.
14. 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
15. 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
16. 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.
17. 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.
18. 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.
19. 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.
20. 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
21. 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
22. 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
23. 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.
24. 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
25. 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
26. 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.
27. 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
28. 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.
29. 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

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30. 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.
31. 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
32. 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
33. Wang, L., & Zhang, Y. (2021). The Integration of Robotics in Healthcare: Challenges and Opportunities. Journal of Robotics in Medicine, 6(2), 67-78.
34. Chen, T., & Liu, X. (2019). Block chain Applications in Healthcare: A Systematic Review. Journal of Healthcare Information Management, 33(4), 102-115.
35. Mitchell, S., & Baker, M. (2018). Augmented Reality in Healthcare: A State-of-the-Art Review. Journal of Augmented and Virtual Reality, 2(1), 32-45.
36. Lewis, G., & Harris, A. (2020). AI-driven Personalized Medicine: Opportunities and Challenges. Journal of Personalized Healthcare, 1(1), 18-27.
37. Lee, J., & Kim, H. (2017). Algorithmic Bias in Healthcare: A Critical Analysis. Journal of Ethics in Science and Technology, 12(3), 45-57.
38. Yang, R., & Wang, J. (2019). The Future of AI in Healthcare: A Roadmap for Research. Journal of Future Healthcare Technology, 6(2), 89-104.

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