# Artificial Intelligence Effect on Healthcare: A Review

Nikita Saklani
Department of Applied Electronics and Software Technology,
L.A.D and Smt. R.P. College for Women, Nagpur,India

Kanchan Bade
Department of Applied Electronics and Software Technology,
L.A.D and Smt. R.P. College for Women, Nagpur,India kanchan.

Pragati Bire
Department of Electronics, Shivaji Science Colllege ,
Nagpur,India

**Abstract**
The integration of Artificial Intelligence (AI) into healthcare has led in an era of remarkable innovation and transformation, fundamentally altering how medical practice and patient care are approached. This paper offers a thorough exploration of the diverse ways in which AI is impacting various areas within healthcare. It highlights significant achievements and advancements, while also addressing the challenges and future prospects in this field. Moreover, it emphasizes the vital role AI plays in tackling pressing issues within healthcare, including enhancement of individual's outcomes and clinical decision-making, and the optimization of healthcare delivery. AI is already changing how we interpret medical images by utilizing advanced DL(deep learning) algorithms. These tools support radiologists in making more precise diagnoses. This paper explores the significant changes AI brings to medical imaging, including real-world examples of AI-driven systems that boost diagnostic accuracy, shorten interpretation times, and enhance patient outcomes. This study examines the important role artificial intelligence (AI) plays in managing personalized medicine and predictive analytics, emphasizing how ML(machine learning) algorithms evaluate massive datasets for predicting illness risk, customize treatment regimens, and streamline clinical procedures which explains how AI has the potential to revolutionise the healthcare delivery by facilitating precision medicine techniques, individualized treatments, and proactive interventions.

**Keywords:**
Artificial Intelligence (AI), Convolutional neural networks (CNNs), Remote patient monitoring (RPM ) , Machine Learning (ML).

## 1. Introduction

The whole healthcare sector has been profoundly transformed by utilizing AI(artificial intelligence), which has resulted in revolutionary improvements in patient experience, providers, and service delivery. With AI along with ML technology's utilization, machines can reason, solve problems, and make judgments on par with or even better than humans. For scientifically enhancing overall patient healthcare results, decreasing/eliminating losses, moreover enhancing operational effectiveness within healthcare ecosystem through innovation, for supporting clinical decision-making with high accuracy, AI systems in healthcare sector evaluate complicated medical data, interpret as well as identify patterns, moreover produce insightful and accurate information.
Important Elements of AI in Healthcare
Natural language processing, machine learning, predictive analytics, the Internet of Medical Things, robotics, ethical complications, interoperability, along with clinical decision support are, in general, the main AI elements in healthcare. Let's take short look at these.

### A)Deep Learning and Machine Learning

Health care's primary goal is a ML with its parts, DL. This technology can learn computer systems from data, select templates moreover take decisions involving human intervention. In health care, DL as well as ML have been important to analyse the complexity Data sets, from medicine in the nest series, it is found to see the first death, death, with the expression and accuracy of the right [1].


DOI: https://doi.org/10.5281/zenodo.18372892

For instance, the DL algorithms, especially CNNs, the skills are shown in skin cancer from the picture of the dermatoscopy, it shows the functions according to the dermatologist [2].

**B)Robotics and Automation**

Beyond surgical support, robotics and automation in healthcare also include patient care robots, laboratory automation, along with logistics support in medical institutions. Surgical robots improve procedure accuracy as well as adaptability, which could shorten recuperation periods and rates of complications. Concurrently, automation in pharmacies and labs increases the precision and effectiveness of medicine distribution and diagnostics, respectively, improving patient safety and service delivery [3].

**C)Predictive Analysis**

Utilizing ML as well as statistical model approaches, predictive analytics examines historical data for making future predictions which translates into identifying individuals who have been more probable of developing especially ailments, streamlining hospital patient flow, and efficiently allocating resources in the healthcare setting. Preventative steps, individualized treatment regimens, and enhanced patient management techniques are made possible by predictive models' ability to predict ailment outbreaks, individual's readmission rates, moreover had adverse drug reactions [4].

## 2. Historical Advancement and Pre-Emptive Applications of AI in Healthcare

AI's healthcare journey evolved from basic, rule-based computations for more advanced ML as well as DL models. This shift has notably improved how we diagnose conditions, personalize treatments, and enhance operational workflows. The incorporation of AI into areas like imaging interpretation, predictive analytics, as well as robotic surgeries demonstrates clear move towards a more data-driven and patient-centred [5] approach. These innovations have been clearing path for improving individual outcomes as well as rising efficiencies within healthcare mechanisms.

AI's journey in healthcare began in 1960s &1970s, when innovators started creating rule-based expert mechanisms aimed at helping physicians diagnose illnesses moreover suggest therapies such pioneering mechanisms utilized established logical as well as rules reasoning for analyzing medical data along with support decision-making. A notable instance from 1970s is the MYCIN mechanism, which showcased AI's ability for diagnosing bacterial infections moreover suggest suitable antibiotics defined over individual symptoms along with lab outcomes [6].

AI's utilization in medical imaging has its roots in late 20th century when initial efforts were made to automate image analysis. With developments in CNNs along with DL, true breakthrough occurred in the early 21$^{st}$century. These innovative technologies can process vast datasets and uncover patterns in images that are often undetectable to human observers. One noteworthy study showcased CNN efficacy in medical imaging, where a model had been trained to classify skin cancer[2]. The results were impressive, achieving accuracy levels on par with experienced dermatologists and highlighting the significant AI potential in revolutionizing medical diagnosis.

### 2.1 Use of Machine Learning in Clinical Decision Support Systems

ML algorithm unfolding during 1980s &1990s marked remarkable point in AI development within healthcare. Approaches like DTs, neural networks, along with SVMs paved way for more advanced CDSS(clinical decision support systems) that could learn from data moreover adjust to novel insights [7]

### 2.2 Combination of Deep Learning and Diagnostic Imaging

DL, an ML branch, emerged as a powerful mechanism to analyze medical imaging data, significantly enhancing diagnostic accuracy. Notably, CNNs have demonstrated outstanding task performance including object detection, image classification, along with segmentation. Researchers have created CNN-based models that can identify illnesses from medical images using accuracy level rivalling human specialists. Such AI-driven mechanisms are being utilized across a range of medical fields, such as pathology, radiology, dermatology, along with ophthalmology, providing support to clinicians to identify conditions like cancer, diabetes, and retinal diseases [8].

### 2.3.Merger of Natural Language Processing in E-Health Records

Artificial Intelligence plays imperative role in NLP and E Health records. NLP techniques helps in analysing extensive text data which enhances clinical decision, coding and documentation. Computers can pull out information unorganized documents including prescriptions and medical and discharge reports [9].


DOI: https://doi.org/10.5281/zenodo.18372892

### 2.4Refining Diagnostic Reliability

AI algorithms, especially DL models, have greatly increased accuracy of various medical imaging techniques. In breast imaging realm, for instance, AI has proven effective in pinpointing malignant tumours in mammograms with exceptional precision, leading to a decrease in both false positives and negatives. A study highlighted that AI models surpassed human radiologists in detecting breast cancer from mammography images, demonstrating a clear enhancement in screening outcomes and ultimately improving patient survival rates.

## 3. Challenges and Considerations

There are several challenges associated with incorporating AI into healthcare that need to be convincingly tackled to unlock its full potential. First and foremost, healthcare data is highly sensitive, which makes it crucial to implement stringent privacy along with security measures for storage, collection, moreover information processing. Other significant hurdle has been lack of interpretability as well as AI algorithm transparency[10], commonly known as "black box" issue. For healthcare professionals along with individuals for trusting AI-driven decisions, they need to understand how those decisions are made, something that becomes difficult when the process lacks clarity.

Additionally, there's a real risk of bias in AI algorithms. If training data lacks diversity, AI mechanism might not function well for underrepresented groups, likely widening existing health disparities. Lastly, integrating AI[11] with current healthcare systems can be problematic. Many healthcare providers still rely on outdated technologies that may not be compatible with modern AI solutions, creating obstacles to effective implementation.

## 4 .Application of AI in Healthcare

### 4.1 ProgressiveImpactof AI in Telemedicine

AI has had a significant impact on telemedicine around the world, revolutionising the delivery of healthcare services remotely. Combining AI capabilities with telemedicine platforms can greatly improve patient care, improve diagnosis accuracy, and streamline workflows. The following are numerous major ways in where AI impacted telemedicine, each supported by appropriate citations.

### A) Interpretation and analysis of medical images

AI algorithms outperform humans in rapid medical images analysis, including MRIs, X-rays, along with CT scans, facilitating accurate diagnosis along with telemedicine interpretation. Such algorithms allow for swift decision-making and can spot abnormalities and detect patterns over visual data. Research by [12] highlighted application of DL algorithms in interpreting chest X-rays to detect prevalent thoracic diseases, illustrating significant AI potential to enhance image analysis for telemedicine purposes.

### A) Remote Patient Monitoring

AI-powered RPM (Remote patient monitoring) mechanisms facilitate ongoing patients' vital signs observation, symptoms, along with various health metrics, all while they are apart from a healthcare facility. These sophisticated systems utilize data in wearable sensors, devices, along with mobile applications to identify irregularities and forecast any potential health decline, with this data being assessed through advanced AI algorithms. For instance, a recent study showcased how AI can effectively analyze data from wearable sensors for predicting heart failure exacerbations for remote monitoring scenarios, underscoring valuable AI-improved RPM role in the field of telemedicine[13].

### B) Scheduling Appointments and Patient Triage

AI-powered chatbots and virtual health assistants make it easier to schedule appointments and perform patient triage on telemedicine systems. These resources interact with patients, evaluate their symptoms, offer preliminary advice, and arrange consultations with medical professionals as required. AI enhances patient happiness, expedites the telemedicine workflow, and cuts down on wait times by automating these tasks.

### 4.2 AI Ethical Inferences For Healthcare

AI has potential of improving individual results, increase diagnostic precision, as well as streamline healthcare delivery, but it also brings up a number of ethical issues that need to be resolved for implementation to be done responsibly and fairly. This conversation will examine a few of the important ethical ramifications and problems related to AI in healthcare, along with pertinent references to back up these claims.

### 1)Explainability, Accountability, and Transparency

The growing dependence on AI in healthcare presents vital questions for accountability as well as transparency. Unlike human clinicians, AI algorithms shouldn't function as "black boxes," that makes it difficult to understand how they generate recommendations or predictions. This lack of clarity can undermine clinicians' trust in AI outputs and their ability to interpret them effectively. When


DOI: https://doi.org/10.5281/zenodo.18372892

AI systems

**2)**Patient Autonomy and Consent

Individuals can be ignorant of amount where AI has been utilized in their care/ might not completely comprehend ramifications of AI-generated recommendations. Assuring effective individual

engagement, informed consent, along with respect for individuals' preferences has been critical for maintaining patient autonomy[14].

## 5. **Conclusion**

Deriving value from health data has seen an astounding rise with marked AI integration in recent years. The ethical implications on care quality are paramount particularly when teamed with low cost options, automation, and high market demands. Flexibility, output and mechanisms of operation, as social systems are further systematized, have notable impacts on socio-economic ramifications. Evaluation of bots goals must correlate with AI technology.

This paper shows the various impact of Artificial Intelligence in Healthcare there are various concepts which are involved like from Historical background of AI, key elements of AI in Healthcare with ML, DL's help and also various challenges and perspectives which can be considered in Healthcare. Some concepts of AI in Telemedicine and Ethical Inferences are also explained.

## References

[1]LeCun, Y., Bengio, Y., & Hinton, G. (2015). "Deep learning." Nature, 521(7553), 436–444.

[2]Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017).Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115–118.

[3]Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017).Artificial intelligence in healthcare: past, present and future. Stroke and Vascular Neurology, 2(4).

[4]Kourou, K., et al. (2015). "Machine learning applicationsincancerprognosis and prediction."Computational and Structural Biotechnology Journal, 13.

[5]Yang, G., et al. (2017). "The application of robotics in surgery: a review." International Journal of Medical Robotics and Computer Assisted Surgery, 13(4).

[6]Buchanan, B. G., & Shortliffe, E. H. (1984). Rule- Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project (The Addison-Wesley Series in Artificial Intelligence). Addison-Wesley.

[7]Hripcsak, G., & Albers, D. J. (2013). Next-generation phenotyping of electronic health records. Journal of the American Medical Informatics Association, 20(1), 117

[8]Gulshan, V., Peng, L., Coram, M., Stumpe, M. C., Wu,

D., Narayanaswamy, A., ... & Kim, R. (2016).

[9]Miotto, R., Li, L., Kidd, B. A., & Dudley, J. T. (2016). Deep Patient: An Unsupervised Representation to

Predict the Future of Patients from the Electronic Health Records. Scientific reports, 6, 26094.

[10]Obermeyer, Z., Powers, B., Vogeli, C., & Mullainathan, S. (2019). Dissecting racial bias in an algorithm used to manage the health of populations. Science, 366(6464), 447-453.

[11]Fichman, R. G., Kohli, R., & Krishnan, R. (2011).

Editorial Overview—The Role of Information Systems

in Healthcare: Current Research and Future Trends.

Information Systems Research, 22(3).

[12]Rajpurkar, P., Irvin, J., Zhu, K., Yang, B., Mehta, H., Duan, T., ... & Langlotz, C. (2018). CheXNet:Radiologist- level pneumonia detection on chest X-rays with deep learning. arXiv preprint arXiv:1711.05225.Studies, Vol. 20, No. 1, pp. 3–19, 1983.

[13]Vankipuram, M., Kahol, K., & Cohen, T. (2018). A predictive analytics approach to reducing 30-day avoidable heart failure readmissions. JMIR Medical Informatics, 6(4), e10104.

[14]Fiske A, Henningsen P, Buyx A. Your Robot Therapist Will See You Now: Ethical Implications of

Embodied Artificial Intelligence in Psychiatry, Psychology, and Psychotherapy. J Med Internet Res 2019;21(5):e13216

[15]Hughes, T. B., Miller, G. P., Swamidass, S. J., & Modeling Toxicity Workbench Community. (2019). Site of reactivity models predict molecular reactivity of diverse chemicals with glutathione. Nature Machine

Intelligence, 1(6), 236–246.



DOI: https://doi.org/10.5281/zenodo.18372892