MACHINE INTELLIGENCE RESEARCH
ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

AI-DRIVEN PERSONALISED TREATMENT PLANS: THE FUTURE OF PRECISION MEDICINE

Sathish Kumar Chintala
Senior Engineer (AI- ML), Texas USA.

ABSTRACT

This comprehensive article explores the intersection of AI and healthcare, specifically focusing on the transformative potential of AI-driven personalised treatment plans within the realm of precision medicine. Tracing the evolution of AI from its early days to its current applications in various sectors, the article underscores its profound impact on healthcare, emphasising responsible development for universal benefit. The research method involves a thorough examination of AI in healthcare through indexed databases, ensuring a comprehensive analysis of the topic. The narrative delves into the role of AI in revolutionising patient care, diagnostics, and treatment planning, particularly in areas such as radiotherapy. Current machine learning techniques and AI algorithms, including Boltzmann Machines, K Nearest Neighbour, Recurrent Neural Networks, Support Vector Machines, Convolutional Neural Networks, Long Short-Term Memory, and Generative Adversarial Networks, are elucidated for their applications in medical contexts. The article emphasises the features and applications of AI in precision medicine. The narrative acknowledges the potential of AI to revolutionise healthcare, providing personalised treatment plans, improved diagnostic accuracy, and effective disease management.

Furthermore, the article discusses the shift from generalised to personalised medicine and the role of AI in assisting clinical decisions. It addresses data protection and privacy concerns, highlighting the importance of legislation and ethical considerations in AI implementation. The conclusion reflects on the burden of chronic diseases globally and the role of precision medicine, AI, and public health approaches in reshaping healthcare paradigms. Overall, this article offers a thorough exploration of AI in healthcare, underscoring its potential for personalised medicine and the imperative need for ethical and regulatory frameworks.

KEYWORDS: Precision Medicine. Artificial Intelligence, Personalised Treatment, ML, Healthcare.

INTRODUCTION

AI is an advancing discipline in computer science that seeks to develop robots capable of doing activities that traditionally necessitate human intelligence. AI encompasses a range of methodologies, including ML, “Deep Learning” (DL), and “natural language processing” (NLP). “Large Language Models” (LLMs) are AI algorithms that employ deep learning techniques and vast datasets to comprehend, condense, produce, and forecast novel text-based content. As text generators, content summarisation, translators, rewriters, classifiers, and sentiment analysts, LLMs are well-suited to a variety of NLP applications. NLP is an area of AI that focuses on how computers and people interact via the use of language. Things like understanding, interpreting, and creating human language fall under this category. Text mining, sentiment analysis, voice recognition, and machine translation are all methods that fall under NLP. From its origins in rule-based systems to the current age of ML and deep learning algorithms, AI has undergone

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

significant modifications during its growth.[i]

The field of artificial intelligence has undergone significant advancements since the creation of the first AI program in 1951 by Christopher Strachey. During that period, artificial intelligence was in its early stages of development and predominantly focused on academic research. John McCarthy convened the Dartmouth Conference in 1956, during which he introduced the phrase "Artificial Intelligence." This event marked the beginning of the modern age of artificial intelligence. Building rule-based and expert systems was the major goal of artificial intelligence research in the '60s and '70s. However, the need for more data and processing resources limited this approach.[ii]

AI studies shifted their attention to ML and neural networks in the '80s and '90s. Thanks to these developments, computers can now learn from data and gradually improve their performance. A number of significant AI developments occurred during this time, such as the development of IBM's Deep Blue. When this computer system faced off against Garry Kasparov in 1997, it won. The 2000s saw further advancements in AI research, particularly in the fields of natural language processing and computer vision. Thanks to this development, AI virtual assistants like Siri and Alexa were born. These assistants can understand natural language and respond appropriately to user questions.[iii] The impact of AI is already profound and is predicted to grow in many areas, including healthcare, finance, and transportation. Intelligent teaching systems have been developed using AI in the academic world. Computer programs with this capability may tailor their instruction to the unique needs of each student. The use of these strategies has improved students' performance in several subject areas, particularly in science and mathematics. Researchers have used AI to sift through massive datasets in search of complex patterns that would be difficult for humans to see.

As a consequence, fields like genetics and medicine development have made tremendous strides forward. Personalised treatment plans and diagnostic tools have both benefited from the use of AI in healthcare settings. We must ensure the proper development of AI and its overall benefit to society as it evolves.

The rapid development of AI opens the door to the prospect of incorporating it into clinical practice, which has the potential to revolutionise healthcare services. To provide healthcare practitioners with the necessary knowledge and resources for the effective integration of AI into patient care, it is vital to document and disseminate information concerning AI's role in clinical practice. The purpose of this review article is to take a look at where AI stands at the moment in the healthcare industry, what it can do, what limitations it has, and how it may be improved in the future. This study aims to simplify the integration of AI into clinical practice and improve understanding of AI's role in healthcare.

RESEARCH METHOD

The National Library of Medicine's (PubMed/Medline), Scopus, and EMBASE index databases were each searched independently, without time constraints. Nevertheless, only publications published in English could be found. In their review research, the writers examined AI applications in healthcare settings in great detail. The authors looked at various combinations of keywords, “such as natural language processing (NLP), machine learning (ML), data science (DL), language learning (LLM), artificial intelligence (AI) in healthcare, AI in medical diagnosis, AI ethics, predictive analytics, and AI applications.” The writers achieved a thorough

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

examination of the topic by implementing language limitations. The publications underwent a rigorous screening process, which involved a thorough examination of their titles and abstracts. Only individuals who satisfied the precise requirements were included. The writers thoroughly explored any disputes or issues in the literature or approach.

AI TREATMENT PLANS USED IN PATIENTS

AI can transform healthcare by enhancing patient care, operational efficiency, and precision. Utilising sophisticated algorithms and ML methodologies, AI can swiftly examine extensive quantities of patient data. AI systems can identify intricate patterns that may go unnoticed by human observers. Through the utilisation of AI technology, healthcare practitioners can enhance their ability to make well-informed decisions regarding patient care. AI technology can optimise the process of creating treatment programs for patients. The healthcare sector is on the verge of seeing a significant transformation with the utilisation of AI, which has the potential to enhance significantly diagnoses and treatment strategies. Through the utilisation of AI, healthcare institutions can optimise patient care, enhance operational efficiency, and achieve more precise diagnostic outcomes.[iv]

Moreover, in the contemporary era characterised by rapidity, medical practitioners encounter myriad obstacles in terms of disease diagnosis and the formulation of efficacious treatment strategies. Even the most seasoned physician or specialist can feel overwhelmed by the immense amount of data that is available. Here is where AI emerges as a transformative force.[v]

AI can significantly improve the precision of diagnoses and treatment strategies in healthcare institutions. Through the utilisation of AI technology, healthcare personnel can enhance their decision-making process about patient care, resulting in enhanced patient outcomes. An essential benefit of AI in diagnostics is its capacity to rapidly and precisely examine vast quantities of data. Conventional diagnostic techniques frequently depend on human interpretation, which is subjective and susceptible to errors. Nevertheless, by utilising AI-driven algorithms and ML methodologies, medical photos and test findings can be scrutinised with enhanced accuracy.

AI also possesses the capacity to facilitate the identification of diseases in their initial stages. AI systems can employ neural networks trained on extensive datasets from past cases to find intricate patterns or anomalies that may elude human perception. This has the potential to result in early intervention and increased likelihood of effective therapy.

AI technology not only enhances the accuracy of diagnoses but also expedites the formulation of treatment strategies for patients. Healthcare providers can utilise advanced analysis techniques and predictive modelling capabilities to create personalised treatment plans tailored to individual patients. These plans take into account specific patient features, such as medical history, genetic information, and lifestyle factors.

Moreover, monitoring systems powered by AI have demonstrated significant potential in improving the effectiveness of post-treatment monitoring while also reducing expenses. Through the continuous analysis of patient data obtained from wearable devices or remote monitoring systems, these intelligent solutions provide prompt intervention when needed, resulting in accelerated recovery periods and cost savings for healthcare organisations. AI, equipped with sophisticated algorithms and ML techniques, can swiftly assess extensive quantities of patient data. It can accurately analyse intricate pictures like X-rays or MRI scans with unmatched precision. AI-powered systems can utilise neural networks and deep learning models created by

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

healthcare software development professionals to identify intricate patterns that may go unnoticed by human observers.[vi]

Treatment planning is a crucial component of the radiotherapy (RT) process. The treatment plan's quality has a direct and substantial impact on the outcomes of patient therapy. Over the past few decades, advancements in computer technology and software have facilitated the creation of radiation therapy treatment planning systems that incorporate advanced algorithms for dose computation and optimisation. Modern treatment planners possess more versatility in creating intricate radiation therapy treatment plans, aiming to minimise harm to healthy tissues and maximise the radiation dosage delivered to tumour targets. However, treatment planning remains predominantly a procedure that is inefficient in terms of time and requires a significant amount of effort in contemporary clinical practice. AI, encompassing ML and deep learning (DL), has recently been employed to automate RT treatment planning. This development has garnered significant interest in the RT community since it holds immense potential for enhancing the quality and efficiency of treatment planning. This article provides a comprehensive analysis of the historical progression, merits, and limitations of different deep learning-based automated radiation therapy treatment planning algorithms. We have also examined the difficulties, problems, and possible avenues for study in DL-based automated RT treatment planning techniques.[vii]

ML TECHNIQUES AND AI ALGORITHMS

In the dynamic realm of healthcare, the incorporation of AI-powered tools is transforming the process of creating medical diagnoses and treatment strategies. AI is revolutionising the healthcare industry by offering the possibility to improve accuracy, efficiency, and tailored care, leading to creative solutions. The vast array of machine-learning approaches and AI algorithms are revolutionising the field of diagnosis and therapy.

- **Boltzmann Machine:** A significant ML technology utilised in healthcare is the Boltzmann machine. This advanced deep-learning technology examines intricate patterns and connections inside patient data, facilitating the identification of diverse ailments and forecasting treatment results. The Boltzmann machine enhances decision-making by offering healthcare professionals valuable insights.
- **Convolutional Neural Networks (CNNs):** CNNs are widely employed in medical imaging for efficient tumour identification, image segmentation, and illness categorisation. CNNs enhance the accuracy of diagnoses, treatment planning, and monitoring of diverse medical problems by effectively analysing and extracting characteristics from medical pictures.
- **Generative Adversarial Networks (GANs):** The incredible capacity of GANs to generate synthetic medical pictures deserves special mention. Images like this may be used to train diagnostic algorithms or improve access to restricted databases, among other research and training applications. GANs provide for more accurate and efficient medical imaging.
- **K Algorithm:** KNN algorithms are essential in the field of medical image analysis. KNN algorithms utilise the capability to compare new images with labelled examples to classify various tissues and identify anomalies, hence enabling radiologists to make precise diagnoses and assist in disease diagnosis.

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

- **Long Short-Term Memory (LSTM) Algorithm:** When it comes to time-series patient data, LSTM networks are the neural networks of choice. LSTMs helps with illness progression prediction, patient outcome support, and individualised therapy decision-making by recognising long-term dependencies and patterns. When it comes to healthcare strategy optimisation, their application is priceless.
- **Recurrent Neural Networks (RNNs):** RNNs are particularly effective for assessing patient data over time and identifying patterns. RNNs play a crucial role in predicting the advancement of diseases, tracking important physiological indicators, and examining patient actions using time-based data. Healthcare providers can utilise the capabilities of RNNs to derive significant insights and make individualised treatment decisions.
- **Support Vector Machine (SVM):** The SVM is another crucial AI technique used in medical diagnosis. This system precisely assesses and categorises medical images, differentiating between healthy and diseased tissues. SVM utilises multiple clinical factors to classify diseases and forecast patients' potential response to particular therapies.

Improved patient outcomes and personalised medicine are on the horizon thanks to the revolutionary impact of ML methods and AI algorithms on diagnosis and therapy planning. By analysing complex medical data and finding patterns that are difficult for humans to notice, AI-driven solutions allow for the early diagnosis of illnesses. By analysing patient data like DNA, medical records, and family medical history, AI also helps with precision medicine, which develops individualised protocols and therapies for various illnesses. By making more customised therapies more accessible and affordable, this breakthrough has the potential to revolutionise healthcare.

FEATURES OF ML TECHNIQUES & AI ALGORITHMS

- **Precision Medicine:** A critical component of ML & AI algorithms in healthcare is precision medicine. By analysing vast amounts of patient data, these technologies may greatly aid physicians in creating personalised treatment plans for each patient. ML models may use patient-specific data such as genetics, lifestyle, and environmental variables to provide personalised suggestions and predict the effectiveness of different treatment options.
- **Better Monitor Remote Patient:** Medical professionals can now keep tabs on their patient's health issues and improvements even while they're not in the office, thanks to remote patient monitoring made possible by ML and AI technology. Devices and sensors worn by the wearer may monitor heart rate, steps taken, and medication compliance in real-time. Improved patient care and lower healthcare costs are the outcomes of remote monitoring, which allows medical professionals to keep tabs on patients from afar and act quickly in response to any possible health problems.
- **Data Quality and Enhanced Decision Support:** The successful use of ML and artificial intelligence algorithms in healthcare relies on accurate and high-quality data. These technologies may ensure correct analysis by enhancing data quality via the use of advanced data processing methods. Better patient care and outcomes are the end outcomes of this because healthcare providers are able to make more educated judgments.

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

- **Improved Accuracy and Time/Cost Savings:** Algorithms powered by ML and AI have the potential to improve significantly the accuracy of medical diagnoses while simultaneously reducing the need for human interpretation. Consequently, this improves the accuracy and timeliness of diagnostics, which in turn reduces the possibility of incorrect diagnoses and needless medical procedures. These technologies can also enhance healthcare practitioners' time management and lower healthcare expenditures via automating particular tasks.
- **Medical Imaging Analysis:** ML and AI have achieved substantial advancements in the field of medical image analysis. AI algorithms possess the ability to rapidly and precisely examine radiological images, such as X-rays, CT scans, and MRIs. This capability allows for the prompt identification and precise diagnosis of disorders. This technology enhances the efficiency of radiologists and minimises the likelihood of human error while reading intricate medical images.
- **Predictive Analytics and Early Disease Detection:** Predictive analytics, which makes use of ML and AI algorithms, allow doctors to single out patients who are at high risk of getting certain illnesses proactively. These technologies may detect illnesses at an early stage, when treatment is most effective, by analysing large amounts of patient data, which includes medical records, genetic information, and lifestyle traits. Treatment efficacy and patient prognosis are both improved by early illness detection.
- **Regulatory Issues and Barriers:** Regulatory hurdles and problems must be recognised and addressed, notwithstanding the many benefits of ML and AI in healthcare. Issues with patient privacy, data security, and regulatory compliance arise from the use of these technologies. To ensure the ethical and responsible use of ML and AI in healthcare, institutions and governments must create clear norms and legal frameworks.

ML methods and AI algorithms are poised to revolutionise healthcare by delivering state-of-the-art solutions in areas such as precision medicine, medical imaging analysis, regulatory compliance, predictive analytics, disease early detection, data quality, remote patient monitoring, accuracy, decision support, and cost reduction. Healthcare practitioners may improve disease management, diagnostic accuracy, and patient treatment plans by using these technologies. However, in order to maximise the potential of ML and artificial intelligence in healthcare, while simultaneously prioritising the protection of patient privacy and data security, it is crucial to address regulatory issues and ensure ethical application.

THE DAWN OF PRACTICING MEDICINE

Historically, healthcare has prioritised the development of broad-based solutions aimed at addressing the needs of a large population of patients exhibiting comparable symptoms. If cough syrup proved effective for the majority of individuals suffering from coughs, with only a tiny minority experiencing a rash as an allergic reaction, there would be no doubt regarding the use of cough syrup for treating a sore throat. The medical community relied on a systematic approach to gaining experience and empirical data from Hippocrates' time until the early 1900s.[viii] Since the beginning of the previous century, healthcare has seen significant transformations due to advancements in diagnostic instruments, the identification of viruses or bacteria, and the innovation of new drugs and medical techniques. The empirical and partly iterative approach of

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

medicine has been replaced by evidence-based medicine. Physicians provided therapies based not only on ancestral practices but also substantiated the effectiveness of these treatments and diagnostic methods through scholarly articles and clinical research. They conducted a thorough investigation into the reasons why cough syrup is the most effective treatment for a sore throat and began to investigate its potential adverse effects. Individuals experiencing an adverse response should be aware that they should refrain from using it and instead seek out an alternative remedy.[ix]

The medical field in the twenty-first century is facing a challenge posed by disruptive technology. The proliferation of inexpensive genome sequencing, cutting-edge biotechnology, home-based health sensors utilised by patients, and the gathering of patient healthcare data through handheld devices has resulted in a substantial volume of information. Due to the advancements in smartphone technology and health tracking devices, known as digital health, it has become impractical for physicians to manually examine the vast amount of data or stay fully informed.

AI ASSISTANCE IN PRECISION MEDICINE AND CLINICAL DECISION SUPPORT

Conventional medical treatments have been formulated with a standardised approach that is intended to be applicable to all individuals. However, whereas these treatments can have positive results for specific individuals, they may not be equally beneficial for others. Precision medicine considers the unique variations in genes, surroundings, and lifestyles of individuals. By doing so, physicians can choose therapies that have the highest probability of benefiting patients, relying on a comprehensive depiction and comprehension of their illness or condition.

Precision medicine is a medical approach that emphasises specific, individualised treatment by utilising large amounts of data. The goal of precision medicine is to individualise, anticipate, forecast, and refine the diagnosis, treatment, and prevention of diseases or illnesses.

The Precision Medicine Initiative has described precision medicine as an approach to health care that takes into account each person's distinct genetic composition, environmental variables, and lifestyle choices in order to diagnose, treat, and prevent illness. Researchers and doctors will be able to use this method to their advantage when trying to forecast how well certain preventative and therapeutic measures would work across various population subsets. It is different from a standardised strategy, which disregards individual differences in favor of creating treatments and prevention methods for the typical person.

The notion of "precision medicine" has been a part of healthcare for quite some time, even if the word is somewhat new. The blood that is given to a patient undergoing a transfusion, for example, is not selected at random. To reduce the risk of problems, blood transfusions are now performed by meticulously matching the blood types of the donor and receiver. Although precision medicine has potential uses in many areas of medicine, its influence on routine healthcare is still limited. This strategy is expected to gain traction in several areas of healthcare and health research in the future years, according to researchers.[x]

Precision medicine integrates advancements in disciplines such as genomics, metabolomics, biomedical data sciences, and environmental sciences. It employs technology such as mobile health, imaging, big data, AI, social engagement, and networking. By utilising advanced extensive data methods, data sets are created with the potential to generate proactive treatment strategies for both individuals and communities. These datasets can be utilised to forecast the likelihood of health risks, the likelihood of disease development, and the likelihood of response

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

or resistance to treatment. Precision medicine refers to the convergence of individuals, their surroundings, fluctuations in their health and illness indicators, and social and behavioural elements throughout time. Precision medicine examines the constituent elements of individuals and populations, as well as the dynamics and interplay of these elements over time.[xi]

AI--enabled personalised medicine has the potential to significantly reduce the uncertainty involved in diagnosing and creating treatment recommendations. Personalised medicine entails a departure from relying on statistical data, general trends, and wishful thinking for optimal results. Instead, it focuses on accurately and explicitly identifying specific anomalies inside an individual patient by analysing their DNA, medical history, and their family's medical history. Essentially, the entirety of the data is present in an individual's DNA.

AI has been integrated into the field of medicine and healthcare for over 50 years, mainly through the use of basic statistical models. The current revolution lies in the abundance of data and the utilisation of sophisticated machine and deep learning techniques to extract valuable information about individuals and their respective cohorts, as opposed to analysing entire populations. This enables physicians to achieve a significantly higher level of precision in diagnosing, predicting outcomes, and establishing treatment protocols. By utilising computational techniques like AI and ML, the National Human Genome Research Institute acknowledges that these technologies will further enhance our comprehension of concealed patterns inside extensive and intricate genomics data sets derived from fundamental and clinical research endeavours.[xii]

A decade ago, individuals diagnosed with an aggressive kind of leukaemia had a significantly diminished likelihood of surviving. Leukaemia encompasses numerous distinct variations, and selecting an appropriate treatment strategy becomes uncertain without knowledge of the specific variety. However, with the current advancements in medical technology, doctors are now able to sequence an individual's DNA, accurately identify the specific variants that are affecting them among the numerous possibilities, and promptly implement the appropriate treatment plan. This significantly enhances their likelihood of survival. The process of sequencing the first genome required a decade of effort from humanity, with a price tag of several billion dollars and the involvement of thousands of researchers. We have made significant progress in recent years. The cost of sequencing a genome is rapidly approaching the $100 threshold due to advancements in next-generation sequencing (NGS) technology. The capacity to sequence DNA and forecast protein structure has grown tremendously, enhancing the level of resolution. The tools have undergone significant advancements, as have the analysis procedures. The capacity for accessing and utilising data has significantly improved.[xiii]

Medical treatment that is tailored to each patient's unique requirements by considering their unique traits, such as their genes, environment, lifestyle, and biomarkers is known as personalised therapy, precision medicine, or personalised medicine. By using targeted treatments that are safer, more efficient, and more successful, this individualised approach aims to improve patient outcomes. Because of its ability to analyse complex information, predict results, and enhance treatment methods, AI has emerged as a vital instrument in the promotion of integrated healthcare. One cutting-edge field where precision medicine is showing its enormous potential is personalised therapy. ML algorithms that can predict which patients may need which therapies using genetic data are still in their early stages, but they hold great promise for the future of real-time recommendation systems. It is essential to do pre-emptive genotyping of patients prior to

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

the real need for this information in order to personalise medicine dosages and regimens. [xiv]

DATA PROTECTION AND PRIVACY

Incorporating mobile phones, measuring devices, and dispersed sensors into routine data collection has greatly improved environmental and personal health monitoring. Only trained medical personnel were able to take vital signs such as blood pressure, glucose levels, and heart rates in bygone decades. These days, data like this may be reliably collected with the use of smartphone apps. Since AI has the ability to improve the efficiency of healthcare service and the quality of patient care, its rapid incorporation into precision medicine is a good thing. However, we must not ignore the ethical risks that come with AI implementations, including the possibility of data breaches, the need of informed consent, and the protection of patient autonomy. It is of the utmost importance to have data protection rules that adequately protect the privacy of individuals, particularly patients, in the precision medicine field, which heavily utilises big data and AI. Federated Learning and Differential Privacy in ML are two examples of private AI approaches that have made significant strides in response to rising privacy concerns around health data collection. A growing number of countries are passing laws to protect citizens' right to privacy. Protecting the privacy of individuals' health records is the primary function of the HIPAA in the US federal government.[xv]

Since HIPAA just protects relevant health information created by "covered entities" or their "business associates," it reveals serious flaws in the modern world. On May 25, 2018, all member states of the EU implemented the "General Data Protection Regulation" (GDPR), marking the beginning of a new era of extensive data protection legislation in Europe. Political movements have emerged in response to GDPR's implementation, calling for stricter regulations of private companies, more monitoring of government management of new and fast developing technologies that threaten data security, and an overall improvement in data protection on a global scale.[xvi]

CONCLUSION

Chronic diseases exert a significant health and economic toll globally, affecting around a quarter of persons who have one or several chronic health disorders. Longitudinal cohort studies have played a crucial role in advancing human health by establishing the foundation for understanding the progression of diseases, identifying the factors that contribute to their development, and discovering new biomarkers. Moreover, the utilisation of biosensors and the advancements in multi-omics have laid the groundwork for enhanced disease classification, developed precise treatments, and enhanced the prediction of outcomes for numerous diseases. Significantly, advancements in digital medicine have facilitated the identification of the fundamental origins of illnesses in individual patients.

Given that the majority of chronic diseases stem from fundamental lifestyle variables, individuals can diminish the probability of having chronic conditions by opting for healthier lifestyle choices. Socio-economic factors, such as employment, education, location, built environment, social networks, and climatic system, have a significant impact on nutrition and lifestyle preferences. To effectively address obesity and chronic diseases related to diet, it is crucial to thoroughly analyse the socio-economic factors that influence food systems, as well as the impact of the environment and climate change. Additionally, it is essential to implement focused public health policies that aim to reduce health disparities.

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

One objective of public health is to advocate for a healthy lifestyle and innovate strategies to prevent, detect, and address diseases that frequently impact individuals. The emergence of precision medicine and the integration of AI may give the impression that medicine and healthcare are once again moving towards an individual-focused approach rather than a community-focused approach to illness management. In contrast, precision medicine, AI, and our extensive knowledge of disease conditions present a significant opportunity to conserve resources for countries that have implemented a uniform and fragmented approach to public health thinking and programming without achieving sufficient returns on their investments. The complex character of chronic diseases, along with the emergence of AI technology and the emphasis on precision in medicine, has the potential to revolutionise and supplant traditional public health approaches with a comprehensive new paradigm. There is still a significant opportunity to implement educational programs, formulate policies, and enhance systems to take advantage of the fast progress in the sector and tailor activities for collectives rather than communities.

REFERENCES

[i] Subramanian, M., Wojtusciszyn, A., Favre, L. et al. (2020) "Precision medicine in the era of artificial intelligence: implications in chronic disease management." J Transl Med 18, 472. https://doi.org/10.1186/s12967-020-02658-5

[ii] Bertalan Mesko (2017) "The role of artificial intelligence in precision medicine, Expert Review of Precision Medicine and Drug Development," 2:5, 239-241, DOI: 10.1080/23808993.2017.1380516 To link to this article: https://doi.org/10.1080/23808993.2017.1380516

[iii] Johnson, K. B., Wei, W. Q., Weeraratne, D., Frisse, M. E., Misulis, K., Rhee, K., ... & Snowdon, J. L. (2021). "Precision medicine, AI, and the future of personalized health care." Clinical and translational science, 14(1), 86-93.

[iv] King, M. R. (2023). "The future of AI in medicine: a perspective from a Chatbot." *Annals of Biomedical Engineering*, *51*(2), 291-295.

[v] A., & Gorman, K. (2023, September 2). Unleashing the Power of Artificial Intelligence for Improved Diagnostics and Treatment Plans. Chudovo. Retrieved December 16, 2023, from https://chudovo.com/unleashing-the-power-of-artificial-intelligence-for-improved-diagnostics-and-treatment-plans/

[vi] "AI Treatment Plans Used in Patients," UHN Research. Retrieved December 16, 2023, from https://www.uhnresearch.ca/news/ai-treatment-plans-used-patients

[vii] Boniolo, F., Dorigatti, E., Ohnmacht, A. J., Saur, D., Schubert, B., & Menden, M. P. (2021). "Artificial intelligence in early drug discovery enabling precision medicine." Expert Opinion on Drug Discovery, 16(9), 991-1007.

[viii] Katti, K. S., Jasuja, H., Jaswandkar, S. V., Mohanty, S., & Katti, D. R. (2022). "Nanoclays in medicine: a new frontier of an ancient medical practice." Materials Advances, 3(20), 7484-7500.

[ix] Bertalan Mesko (2017) "The role of artificial intelligence in precision medicine, Expert Review of Precision Medicine and Drug Development," 2:5, 239-241, DOI: 10.1080/23808993.2017.1380516

ISSN:2153-182X, E-ISSN: 2153-1838
Vol. 17 No. 02 (2023)

[x] What is precision medicine?: MedlinePlus Genetics. Retrieved December 16, 2023, from https://medlineplus.gov/genetics/understanding/precisionmedicine/definition/

[xi] Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Rab, S. (2022). "Significance of machine learning in healthcare: Features, pillars and applications." International Journal of Intelligent Networks, 3, 58-73.

[xii] King, M. R. (2023). "The future of AI in medicine: a perspective from a Chatbot." Annals of Biomedical Engineering, 51(2), 291-295.

[xiii] Hallak, R. (2023, January 24). "AI's Biggest Promise: The Democratization Of Precision Medicine." Forbes. Retrieved December 16, 2023, from https://www.forbes.com/sites/forbestechcouncil/2023/01/24/ais-biggest-promise-the-democratization-of-precision-medicine/?sh=3da890931ba1

[xiv] Huynh, E., Hosny, A., Guthier, C., Bitterman, D. S., Petit, S. F., Haas-Kogan, D. A., ... & Mak, R. H. (2020). Artificial intelligence in radiation oncology. Nature Reviews Clinical Oncology, 17(12), 771-781.

[xv] Wang, C., Zhu, X., Hong, J. C., & Zheng, D. (2019). Artificial intelligence in radiotherapy treatment planning: present and future. Technology in cancer research & treatment, 18, 1533033819873922.

[xvi] Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., ... & Albekairy, A. M. (2023). "Revolutionizing healthcare: the role of artificial intelligence in clinical practice." BMC Medical Education, 23(1), 689.