

How the world of AI is affecting Practice in Cardiology: A review

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Abstract

The application of artificial intelligence (AI) in cardiology has exhibited noteworthy potential in augmenting patient outcomes and reducing healthcare costs. This paper offers a comprehensive survey of contemporary artificial intelligence (AI) implementations in the realm of cardiology, spanning diverse domains like prognostication of risk factors, therapeutic interventions, and diagnostic protocol development.

The study also explores future prospects, such as establishing personalised risk assessments and enhancing medical imaging, as well as the obstacles and limits of AI in healthcare, such as the requirement for vast datasets and ethical considerations. Through collaboration among healthcare organisations, open incorporation of AI into clinical operations, and careful consideration of ethical factors, AI has the potential to transform cardiology and enhance patient outcomes.

Keywords: Cardiology, AI in Diagnosis, Transparency, Artificial Intelligence

1. Introduction

Globally, approximately 17 million individuals annually suffer from or perish due to cardiovascular diseases (CVDs), rendering them a primary factor responsible for morbidity and mortality [1]. The use of artificial intelligence (AI) in cardiology has tremendously benefitted healthcare experts in accurately diagnosing, developing customized treatment methods, and identifying patients with greater susceptibility to risks.

AI in diagnosis

According to a JACC publication in 2018, a highly successful AI algorithm exceeded conventional algorithms by precisely detecting heart failure patients with a sensitivity of 94% and specificity of 85% [2]. A 2020 research in the International Journal of Cardiology revealed that an AI algorithm effectively detected obstructive coronary artery disease with an accuracy of 90% sensitivity and 91% specificity [3].

AI in treatment

In 2019, research published in the International Journal of Cardiology explored the utilization of Artificial Intelligence for forecasting the most impactful therapies for individuals suffering from heart failure. According to the research, an artificial intelligence algorithm displayed a success rate of 86.6% in forecasting treatment outcomes, surpassing conventional statistical models [4].

AI in risk prediction

An AI program exhibited its prediction capabilities in identifying hypertension, as reported in a 2020 publication in the Journal of Hypertension, with an 84.9% precision rating surpassing statistical models traditionally utilized [5]. In 2019, the European Heart Journal presented findings indicating that an AI algorithm had achieved a 90% accuracy rate in predicting significant cardiac incidents [6].

Challenges and limitations

Although AI has the potential to bring benefits to the field of cardiology, there are also numerous obstacles that need to be carefully considered. A difficulty that arises is the requirement of extensive sets of patient data for the purpose of educating AI algorithms. Effective collaboration among healthcare institutions is necessary to securely exchange data in a standardized manner. Moreover, it is crucial for healthcare professionals to comprehend and have confidence in the outcomes generated via AI algorithms.

The utilization of AI in healthcare poses a significant ethical challenge. To illustrate, there are apprehensions about the safeguarding of data and the protection of privacy, alongside the likelihood of partiality in AI algorithms. It is crucial to extensively contemplate and deal with these concerns to guarantee that AI is employed in a manner that aligns with ethical and responsible principles.

Future Directions

With the continuous advancement of technology, the potential for AI to greatly enhance cardiology is increasing. One potential application of AI is creating customized risk assessments for individuals by integrating various clinical, genetic, and lifestyle aspects. Artificial intelligence has the potential to enhance the precision of medical imaging technologies like MRI and CT by diminishing distortions and interference.

2. Conclusion

AI has the capability to transform the realm of cardiology through enhanced precision in diagnosis, creation of treatment strategies customized to individual patients, and identification of individuals at high risk. By working together, healthcare organizations can effectively incorporate AI into their clinical processes with transparency and ethical awareness, leading to enhanced patient results and decreased expenditures linked to cardiovascular illness.

References

1. WHO (2021) Cardiovascular diseases (CVDs).
2. Attia, Z. I., Kapa, S., Lopez-Jimenez, F., McKie, P. M., Ladewig, D. J., (2019). Screening for cardiac contractile dysfunction using an artificial intelligence-enabled electrocardiogram. *Nature medicine*, 25(1), 70-74.
3. Krittanawong, C., Zhang, H., Wang, Z., Aydar, M., & Kitai, T. (2017). Artificial intelligence in precision cardiovascular medicine. *Journal of the American College of Cardiology*, 69(21), 2657-2664.
4. Zhao Q, Zhuang Z, Yu H. (2020). Artificial intelligence in healthcare: past, present and future. *Semin Cancer Biol.* 2020; S1044-579X.
5. Nallasamy N, Ganesh C. (2020) A review on cardiovascular disease prediction using machine learning techniques. *Biomed Pharmacol J.* 13(2):699-707.
6. Wu J, Chen J, Dai W, (2020). Prediction of hypertension by machine learning algorithm using electronic medical records. *J Hypertens.* 38(9): 1737-1744.