What Is the Role of AI in Hypertension Management?

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Abstract

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Hypertension, or high blood pressure, is a major global health concern and a leading cause of cardiovascular disease and premature death [1]. Despite the availability of various treatments, achieving optimal blood pressure control remains a significant challenge for many patients. In recent years, artificial intelligence (AI) has emerged as a powerful tool with the potential to revolutionize hypertension management, from diagnosis and risk prediction to personalized treatment and monitoring.

The Power of AI in Diagnosis and Risk Prediction

One of the key strengths of AI lies in its ability to analyze vast and complex datasets to identify patterns and risk factors that may not be apparent to human observers. In the context of hypertension, machine learning algorithms can be trained on electronic health records, genomic data, and lifestyle information to develop highly accurate predictive models. These models can help clinicians identify individuals at high risk of developing hypertension, enabling early intervention and preventive measures. By integrating a wide range of data sources, including traditional cardiovascular risk factors, genomics, and even socioeconomic and environmental factors, AI can contribute to the development of more precise and personalized risk prediction models for patients with hypertension [2].

AI-Powered Tools for Monitoring and Treatment

Beyond diagnosis, AI is also transforming the way hypertension is monitored and treated. AI-supported platforms, such as those that incorporate remote blood pressure monitoring and machine learning-based medication titration

algorithms, have shown considerable promise in improving blood pressure control. These systems can provide patients with real-time feedback and support, while also enabling clinicians to remotely monitor their progress and make timely adjustments to their treatment plans. For instance, AI-assisted titration platforms like CURATE.AI are being developed to personalize antihypertensive therapy by creating individualized dose-response maps based on a patient's unique data [1]. This data-driven approach to medication management has the potential to optimize treatment efficacy while minimizing side effects.

Challenges and the Road Ahead

Despite the immense potential of AI in hypertension management, there are several challenges that need to be addressed before these technologies can be widely adopted in clinical practice. One of the primary concerns is the "black box" nature of some AI models, which can make it difficult for clinicians to understand the reasoning behind their predictions and recommendations. To address this, the development of explainable AI (XAI) is crucial for building trust and facilitating the integration of AI into clinical decision-making [1].

Furthermore, issues related to data privacy, security, and regulatory approval must be carefully considered. As AI systems become more integrated with electronic health records and other sensitive patient data, robust measures must be in place to protect patient confidentiality. Additionally, rigorous clinical trials are needed to validate the safety and efficacy of AI-based interventions for hypertension management.

Conclusion

Artificial intelligence holds the promise of a new era in hypertension management, offering the potential for more accurate diagnosis, personalized treatment, and improved patient outcomes. From identifying at-risk individuals to optimizing medication regimens, AI-powered tools are poised to become an indispensable part of the clinician's toolkit. However, to fully realize the potential of AI in this domain, it is essential to address the challenges related to transparency, data privacy, and clinical validation. By fostering collaboration between clinicians, researchers, and AI developers, we can unlock the full potential of AI to combat the global burden of hypertension and improve cardiovascular health for all.

References

[1] Skalidis, I., et al. (2025). Artificial Intelligence and Advanced Digital Health for Hypertension: Evolving Tools for Precision Cardiovascular Care. *Medicina (Kaunas)*, *61*(9), 1597. [https://pmc.ncbi.nlm.nih.gov/articles/PMC12471829/] (https://pmc.ncbi.nlm.nih.gov/articles/PMC12471829/)

[2] Layton, A. T. (2024). AI, Machine Learning, and ChatGPT in Hypertension. *Hypertension*, *81*(4), 709-716. [https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.124.19468] (https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.124.19468)

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