

Implementation of an AI-Based Diagnostic Management System for Rapid Detection of Cardiovascular Disease

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Abstract: Cardiovascular disease remains a leading cause of global mortality, necessitating advancements in early detection and prevention methods. This study investigates the application of artificial intelligence (AI) in enhancing the accuracy and speed of cardiovascular disease diagnostics, with a specific focus on preventing heart attacks. Reviewing existing AI models and their integration into clinical workflows, we identify significant improvements in diagnostic precision and patient outcomes. Our findings highlight AI technologies like AliveCor, KardiaMobile, HeartFlow, FFRct, and Viz.ai, which demonstrate superior accuracy, sensitivity, and specificity compared to traditional methods. Despite these advancements, challenges in seamless integration, data privacy, ethical considerations, and regulatory compliance persist. We propose a comprehensive strategy to address these barriers, emphasizing the need for longitudinal studies, diverse population validation, and the development of ethical frameworks. The successful implementation of AI in cardiology holds promise for reducing the global burden of cardiovascular diseases, yielding substantial health, social, and economic benefits.

1 INTRODUCTION

Cardiovascular disease is a major health concern worldwide, serving as a prime contributor to the global mortality rate. The main motivation of this study was to improve existing and develop new AI-based models for the prevention of cardiovascular diseases, with particular emphasis on the prevention of heart attacks. Due to the recent artificial intelligence (AI) revolution, the accuracy of clinical decision support systems has improved significantly and Modern AI systems have showcased the potential to augment traditional methods such as looking at blood pressure, cholesterol levels, and body weight with advanced predictive capabilities in the early detection of disease through monitoring, enhanced surveillance, and the early warning of disease prediction, helping in reducing the time for diagnosis. “Modern AI may be as good as an expert cardiologist in diagnosing serious heart attacks” said Professor and Director of the Medical Technology Education Centre in Taiwan. Technological, social, and ethical

challenges such as data security, privacy issues, and ensuring equal access to preventive interventions need to be addressed for the successful implementation of these AI preventive medication systems.

1.1 Existing Evidence

Numerous AI models and technologies have been developed for cardiac disease diagnosis, ranging from retinal scan technologies to sophisticated AI systems. These innovations have demonstrated promising results in various studies by evidently reducing almost 10 minutes in the diagnosis of patients suffering from heart attacks and sending them for treatment, showcasing their potential to revolutionize cardiovascular healthcare. The improved accuracy for diagnosis of hospitalized patients has made doctors trust the technology, however, significant challenges remain in validating the clinical utility, ensuring seamless integration into existing healthcare systems, addressing ethical and regulatory concerns, and