Designing and Integrating TelePort HyperDi Multimeter Into an AI-Telehealth System for Cost-Effective Digital Testing, High-Throughput Screening and Real-Time Medical Care Assistance for Diabetes and Hypertension

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Hypertension and diabetes often co-occur, causing over a third of Vietnamese's annual deaths. However, only 43% of people with hypertension and 31% with diabetes have been diagnosed, which results in a limited number of patients receiving proper treatment. This study aims to bridge this gap by developing a TelePort HyperDi Multimeter as a core in an AI-TeleHealth system for early detection and treatment of diabetes and hypertension. Our biomedical device was designed to examine individual risk factors for diabetes and hypertension. The web application allows users to input data and get real-time feedback on their disease state. Based on the predictions, users can be connected to suitable doctors who provide medical care. As a result, the equipment has been successfully developed and applied to gather risk factor data from over 3,000 Vietnamese individuals. The data would be automatically transmitted to a server to establish a large disease dataset of Vietnamese patients. The dataset was then fed into validated machine learning models to predict the diseases. Two ANN machine learning (ML) models were implemented into the web application to predict diabetes and hypertension, achieving an accuracy of over 0.98. Importantly, the results showed that capillary blood glucose could be used interchangeably with venous blood glucose in diagnosing diabetes. The proposed system is currently used at several medical centers in Vietnam. In conclusion, TelePort HyperDi Multimeter integrated into AI-TeleHealth system was developed as an accurate, low-cost solution to support early-stage detection and treatment of diabetes and hypertension.