

The role of Artificial Intelligence (AI) in diabetes management: OPPORTUNITIES to embrace and CHALLENGES to face

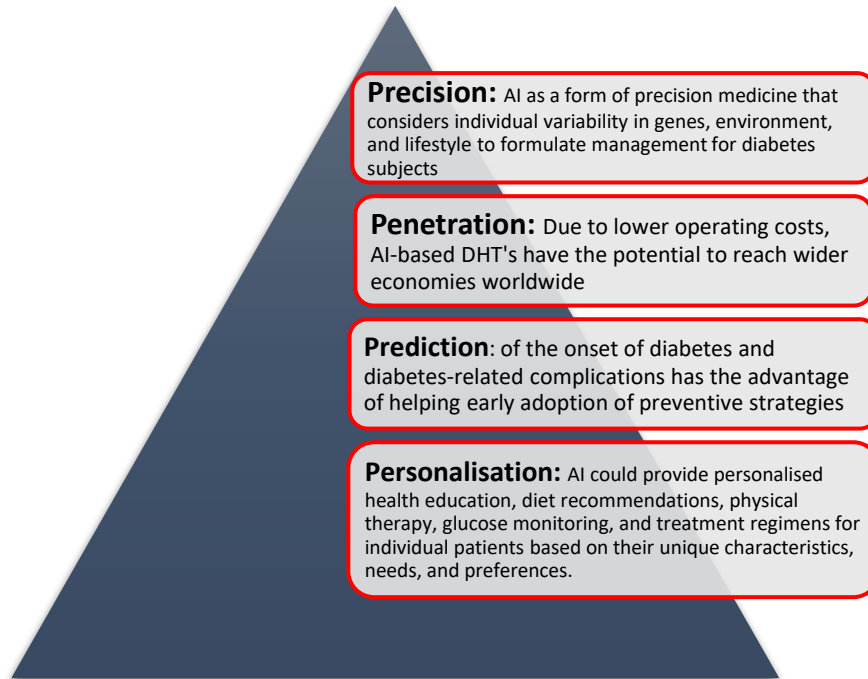
The global pandemic of diabetes presents unique challenges to the health sector worldwide. With the prevalence of in adults 20–79 years of age reaching 13.0% (2021 IDF Diabetes Atlas), diabetes has not only become the leading chronic disease condition with highest morbidity and mortality but the most important health and economic burden globally.

In this context, the traditional models of diabetes prevention and its management will have significant limitations. Adoption of more recent innovations like integrated diabetes management, use of technology and devices, wider awareness of inpatient diabetes care may have, in the short term, improved diabetes outcomes but persistent obstacles related to uneven distribution of medical resources - particularly in those socioeconomically deprived, lack of high-quality human resources and reduced capacity will continue to denude diabetes care in the longer-term. The emergence of digital health technologies (DHTs), especially artificial intelligence (AI), may help address these obstacles and alleviate the disease burden of diabetes in the future, because AI-based DHTs in diabetes care have been shown to improve multiple facets of diabetes care.



AI has the potential to enhance various domains of diabetes management

As elucidated above, AI has the potential of revolutionising diabetes care by positively impacting various aspects including lifestyle and dietary management, predictive modelling, personalised patient care and advanced diagnostics – all of which can lead to improved short and long term outcomes. Its attributes and the opportunities it provides in diabetes care, can be summarised as below:



Excellent examples of the above attributes include the IDx-DR AI, approved by the FDA in 2018 for automatic interpretation of diabetes retinopathy from fundal images, CamAPS HX fully automated closed-loop insulin delivery system and the use of Functional MRI AI algorithms to predict cognitive decline in diabetes subjects.

In recent years, my personal involvement in the advancement of AI within diabetes includes being part of a working group designing a Bayesian learning algorithm to detect susceptibility for developing diabetes and generative AI models aimed at adjustment of insulin dosing.

However, despite the evidences demonstrated so far and its far and wide reaching capabilities in assisting diabetes management, AI is not without its own limitations and barriers that need addressing prior to universal adoption in diabetes management. Firstly, as with all ML (Machine Learning) programmes, quality of data input is fundamental to its success and to mitigate these pitfalls, AI algorithms must be trained on impartial datasets that include and accurately represent social, environmental, and economic factors that influence diabetes health. Secondly, improper or user-unfriendly design of AI-based DHTs will probably give rise to non-adoption or early abandonment of the technology. Hence, AI-based DHTs need to be developed through a constant process of refinement and iterative development to address users' demands. Thirdly, cutting-edge AI systems cannot realise their full potential unless they are integrated into existing diabetes-related clinical and digital workflows. Not uncommonly, AI systems could also be perceived as encroaching on clinicians'

professional role by making a competing diagnosis, presenting a “threat to autonomy” that may make clinicians reluctant to use, rely on, and trust. Fourthly, enhanced privacy and security assurances that protect patient records and devices are of paramount importance. Finally, non-adherence has been proposed as one of the leading causes of delays in adopting DHTs in diabetes clinical practice. User adherence is crucial to the effectiveness of DHT applications in the diabetes management and can be adversely affected by user-convenience, user experience and ignorance of technology.

In conclusion, AI has the potential to optimise diabetes care by providing personalised, precise, and data-driven support to patients and health-care professionals. By addressing the challenges and capitalising on the opportunities, AI could play a pivotal role in transforming diabetes care and improving the lives of millions of people with diabetes worldwide.