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AI in clinical medicine: the need for digital-human interaction

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Introduction

Artificial intelligence (AI) comprises a panoply of digital functions, which use data analysis to reach meaningful and potentially important conclusions. AI claims to improve performance which benefits mankind and uses digital systems that perform tasks that typically require human intelligence [1]. These tasks include learning, reasoning, problem-solving, pattern-recognition and language understanding. In contrast, creativity and discernment are human skills, which can establish and assess human relationships and emotions. This, AI cannot currently do. In medicine, for example, the creation of the doctor-patient relationship is the basis of a management process relying on the patient's trust and the physician's commitment. However, such a relationship is regularly confronted with emotions such as fear, anxiety, and doubt and on the positive side, with gratitude and determination. The discernment of and reactions to these sentiments are currently beyond the reach of AI.

The successful physician, whether a general practitioner or university specialist, needs the benefits of AI to stay abreast of scientific progress. However, AI alone will not make his/her patients feel better or have the confidence to face a long-term illness. For this the human touch is needed, with eye contact and encouraging words and the sensitivity to perceive changes in morale and mood. However, AI is capable of automating tasks with higher processing speeds than humans can achieve, thus releasing time for quality HCP-patient interaction.

To what extent can AI replace human activity? The installation of an AI programme can only be justified if its performance of a specific task is shown to be statistically non-inferior and ideally superior to human performance. Claims of superior AI abilities must always be proven, notably when they concern human clinical management. Recently an AI project, based on interpretation of chest X-rays in elderly male subjects to diagnose lung cancer in a primary care setting, was shown to be inferior to the performance of experienced radiologists [2]. Logically, the AI programme was not adopted and human tasks were preserved.

AI in diabetes management

The digital-human interaction opens-up enormous potential advantages in clinical management, notably in enhancing the benefits of precision medicine. In paediatric Type 1 diabetes for example an automated AI-based Decision Support System facilitated insulin infusion calculations and was shown to be non-inferior to physician-guided recommendations [3]. The ability to predict hypoglycaemia was recently tested by a wearable AI system which learnt and recognised patterns of ECG heartbeats characteristic of different levels of glycaemia [1]. However, these systems cannot operate optimally without trained healthcare professionals (HCPs) who teach the patient the appropriate responses to digital messages transmitted from the device.

Growth disorders

The earliest diagnosis of disorders such as Turner syndrome, coeliac disease and growth hormone deficiency have been reported from Finland. In the Espoo region, primary care nurses measured height regularly and frequently in children from an early age. Height measurements were entered into a computer system programmed to recognise abnormal patterns of growth, namely the degree of short stature, deviation from the mid-

parental target trajectory and a decrease in growth velocity [4]. The presence of such abnormal variables was signalled and a paediatric endocrinologist reviewed each abnormal data-set to decide if the patient needed further investigation. An increase in pre-school diagnoses was reported using this method of automated monitoring compared to a traditional short stature referral strategy [4]. Notably the digital-human interaction was essential for the success of the automated programme.

Similar programmes have been created to analyse multiple variables from electronic medical records for prediction of central precocious puberty (CPP) [5]. Finally, anthropometric data related to growth hormone therapy adherence can be transmitted via digital platforms through an electronic growth hormone (hGH) delivery and recording device to inform decision-making about future therapeutic changes to improve growth [6]. Risk factors for poor adherence can thus be identified. This use of AI is a prime example of the importance of the digital-human interface. Digital data is simultaneously transmitted to HCPs trained to question patients and their families about poor adherence and its circumstances in each patient. The digital detection of sub-optimal adherence to hGH therapy has made a significant difference to overall long-term growth responses [7].

Conclusions

AI amplifies and augments, rather than replaces, human intelligence and the integration of digital technology into clinical paediatrics should be about cooperation rather than conflict [1]. In their present form, AI systems and algorithms cannot reason or draw upon experience or intuition nor use emotion or empathy to support clinical decision-making. Children are not biological models, but have individual needs and vulnerabilities and are also considered in the context of family relationships and dynamics. In this context, the core value of clinical care needs to remain at the heart of the relationship between a patient and a healthcare professional. However, paediatric endocrinologists need to embrace the future potential of AI in their clinical practice.

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