published in Reader's Digest,
19 October 2023

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Whether helping you search the web, recommending content on Netflix or products on Amazon, or immortalising Abba as a virtual version of themselves in digital, life-size avatars—or “ABBAtars”—on stage, artificial intelligence is everywhere.In its recent long-term workforce plan, the NHS spells out the support on offer through AI, to a staff who are exhausted, depleted and stretched, trying to treat 1 million people every 15 hours. But is it ethical? Is it enough? Will it erode, or enhance, the doctor-patient relationship?

Alarm over AI

In May 2023, the World Health Organization [4] called for caution when using artificial intelligence to help doctors diagnose and make clinical decisions, through computers that have crunched huge amounts of patient data to make models and predict patterns of disease. The technology needs vetting, validating and verifying for safety: “untested systems could lead to errors by health-care workers, cause harm to patients, erode trust in AI and thereby undermine (or delay) the potential long-term benefits and uses of such technologies around the world,” says the WHO.

They also ask about the human data used to train AI. Was consent given by patients to dissect their data in this way? How diverse is the data? Does it cover a broad cross-section of society, or might it be biased and not inclusive? Might it be misused to spread disinformation about disease?

Harvesting the health benefits

Since 2020, the NHS has been monitoring the progress of AI in healthcare through its “AI-Lab [5]”. More than £100 million has been invested in 86 projects, including those that relate to cancer, stroke, respiratory and skin diseases.

With 112,000 job vacancies in the NHS, it’s hoped that AI can free up staff time and improve efficiency. Some administrative tasks can be automated; speech recognition technology serves as a virtual scribe; scans can be seen and images interpreted by AI in the first instance; and drugs dispensed and surgery assisted by robots. In the emergency department, it’s estimated that [6] a minute cut from each patient consultation would free up 400,000 extra hours each year; a similar shaving would release 5.7 million

hours of GP appointment time.

'DOC@HOME [7]' technology allows blood pressure and other readings to be sent to the doctor, so that signs of sickness are spotted sooner, whilst unnecessary appointments are avoided. AI can also analyse facial features, identifying signs of pain in people who are otherwise unable to voice their pain; acoustic monitoring picks up sounds from care home bedrooms, alerting to falls or fits or calls for help.

Balance is needed, though, between AI in the health care setting and human creativity, critical thinking and intuition. The tone of a voice and the touch from a hand can meanwhile communicate a message of reassurance and comfort that technology never can, especially in dementia [8] when spoken words may have lost their meaning.

Homing in on the heart

"Our new AI reads complex heart scans [9] in record speed, analysing the structure and function of a patient's heart with more precision than ever before. The beauty of the technology is that it replaces the need for a doctor to spend countless hours analysing the scans by hand" says consultant cardiologist Dr Rhodri Davies, reflecting on the new AI scanner that takes just 20 seconds to scan a patient, compared to the 13 minutes or so taken by a doctor to manually analyse images from an MRI scanner. It's also more precise than the human eye and can help diagnose heart disease, and possible damage to the heart during chemotherapy.

ECGs (tests to check your heart rate and rhythm) can also be analysed by AI – an improvement on the computer programmes which have long been used to do this, but which do not always capture the complexity and nuances of an ECG.

Hannah Smith, from the Department of Computer Science at Oxford University, is working with AI to further improve the way that ECGs are interpreted, since there is concern that ECGs are misread and misdiagnosis made, if a person's ECG is not adjusted according to their unique body size and shape.

"When sensors are stuck to a person's bare chest to read the ECG, they sit at very different angles and distances from the heart depending on the geometry of the patient's upper body, and the heart itself, complicating the ECG reading," explains Hannah. AI tools are being trained with thousands of MRI scans to make 3D images of chests and hearts; Hannah is using a mixture of statistics and mathematical modelling to then learn how the shape of the heart and torso relates to the ECG, so that future ECG tests can be tailored to each person's true anatomy, giving an accurate reading of the heart's electrical activity. "This can be especially important when it comes to women, because their hearts are smaller and differently located, making the tell-tale signs of serious heart attacks more subtle, so easier to miss".

Dangerous heart rhythms are sometimes left undiagnosed, leading to sudden arrhythmic death syndrome [10] (or SADS), when someone dies suddenly and unexpectedly because of cardiac arrest. Improving interpretation of irregular heartbeats is one example of how AI can be good news in medicine.

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