How can AI help in healthcare?

Introduction and context

Despite the hype, the current adoption and scaling of AI in healthcare is underwhelming. The lack of adoption is reflected in academic reviews, which found the majority of studies were retrospective and many were of early and small-scale reviews [1]. A 2021 European Union report found that actual AI adoption in healthcare was limited to specific departments and use cases [2]. Reviews of 647 Covid-19 AI tools found that none of them were clinically fit for purpose [3].

ChatGPT and GPT 4.0 have re-fuelled a vigorous debate about the transformative potential of AI in healthcare.

What's the true potential for AI in healthcare?

Specific use cases

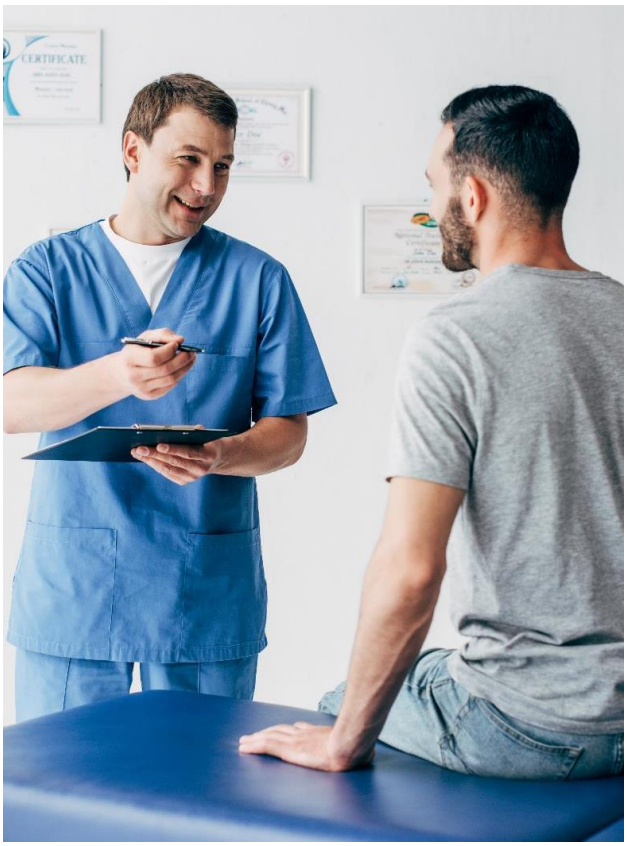
AI has the potential to improve both healthcare operations and patient outcomes. Considering two dimensions helps understand where the opportunities for AI exist and identify potential use cases.

First, there are 3 'areas' where AI can add value:

1. **non-clinical | back-office** - activities that are not directly related to the delivery of care but are required for the proper functioning of healthcare systems, including resource allocation, and demand and supply planning. In many ways the use of AI in this area is no different from its use in other industries.
2. **enhancing delivery of care –** activities related to diagnosing clinical issues and delivering (or enabling self-management of) the most appropriate interventions.
3. **increasing productivity –** an area in-between non-clinical | back office and enhancing delivery of care, including items such as planning patient pathways and helping clinicians prioritise workloads.

Second, there are 4 'stages' of the patient journey or healthcare workflow:

1. **plan -** involves preparing to deliver care, including reviewing historical data and considering future scenarios including demand and related resource needs.
2. **prevent –** builds on the 'plan' activities to take the opportunity to be proactive, for example population level interventions and activities such as screening.
3. **deliver –** includes a range of activities related to care delivery and enabling self-management.
4. **manage –** activities to ensure the successful running of health systems, including funding flows and payments, and monitoring of quality and outcomes.



Combining the above two dimensions creates a ‘grid’ framework, as below:

	01 | Plan	02 | Prevent	03 | Deliver	04 | Manage
Non-Clinical | Back Office	Supply chain and logistics optimisation, and resource allocation	Population health	Optimising the supporting functions such as finance and HR	Enabling accurate and timely payments
Increasing Productivity	Designing new patient pathways	Running campaigns to provide personalised interventions	Enhancing human-led medical and surgical procedures	Extracting information from EHRs to support continuous improvement
Enhancing care delivery	Identifying personalised treatment	Prevent avoidable errors and adverse drug effects	Supporting triage	Solutions to support remote monitoring and care delivery

Considering the ‘intersections’ along the grid helps identify existing use cases and assess new ones.

For example, at the intersection of non-clinical | back office and prevent is population health. AI can go beyond existing rules-based methods and more accurately identify the different groups of patients with different needs and the specific management they need, and to be able to evaluate the effectiveness of the interventions. With a renewed focus on prevention and regional reconfigurations – for example, Integrated Care Systems bringing together health and care organisations – this will be a key area of focus.

Another example in the non-clinical | back office area is in the manage stage, enabling accurate payments. For example, KPMG have developed a product called Cognitive Contract Management (CCM) which automatically scans and analyses information in contracts, invoices and supporting documents, such as timesheets. It uses AI techniques to identify potential contract issues and commercial leakage, including billing errors, leading to potentially significant cost savings.

At the intersection of increasing productivity and deliver, use cases centre around the delivery of care by clinicians. For example, prediction of low blood pressure during a general anaesthetic given during a surgical procedure or helping the clinician identify areas of abnormality during endoscopy scan of a patient.

As Electronic Health Records (EHRs) become more prevalent, one of the important areas will be around the prevention of avoidable errors and adverse effects (at the intersection of enhancing care delivery and prevent). For example, through analysing data from EHRs, AI could flag the risk of rare adverse drug reactions or interactions and help healthcare

professionals make better decisions. AI could also help predict surgical complications, including post-surgery blood loss, and flag up patients at risk of developing pressure ulcers while in bed or having a fall. This presents a valuable opportunity to improve the current decision support systems.

Radiology has seen a relatively high rate of AI adoption, driven by better availability of good quality, digitised data, and a digitally savvy workforce. NHS SBS released a procurement **framework** in 2022 to enable the buying of AI solutions to support decision making in stroke patients. Brainomix is a good example. It uses Machine Learning techniques to review CT scans of the brain to identify and quantify damage caused by lack of blood flow, and to identify blockages of blood vessels in the brain. It is now implemented in almost two thirds of acute stroke units in England. It’s improving both turnaround times and the number of patients achieving independence after a stroke.

It’s not all straightforward

There are a lot of success stories in other industries – for example Netflix, Amazon and Uber use AI at scale to improve operations and provide extra functionality to their users. They make the best use of the large amount of data they can access (more than 100 million users each), focus on the user experience (rather than the technology only), and are helped by use cases where there is a larger margin for error (movie recommendations versus patient lives).

Healthcare has higher stakes. Challenges to AI adoption and scaling within healthcare are across 3 categories - people, systems (deployment ecosystem for the solution) and technology.

People

Due to the nature of healthcare, users need to really trust and have confidence in the output of the solutions before they use them. Even before that, healthcare operators and managers need to have adequate knowledge to be able to make investment decisions across the many AI solution choices. Especially in the current environment with numerous operational challenges, frontline staff often do not have the time or headspace to help co-develop solutions or to help with pilots and subsequent implementations.

Systems

Solutions need to be integrated into established clinical pathways and healthcare processes, as well as multiple IT systems. Funding and procurement can be complex, and innovators need to comply with various regulatory and data governance requirements.

Technology

Unlike other industries and companies discussed above, healthcare data is siloed, in different formats, and not easy to access. Once data is obtained, careful consideration needs to be given to avoid biases and respect the patients’ privacy.

How to make the best of AI

Healthcare organisations may not often have the necessary foundations to deploy AI at scale. Developing a data (and AI) strategy and implementation plan enables you to assess the current state and actions required to build the foundations needed to make the most of data, start leveraging AI tools and maximise the return on investment. A well-articulated strategy also helps gain stakeholder buy in and make a compelling case for investment.

With the NHS facing huge operational pressures, including elective backlogs and increased urgent and emergency care workloads, improved access to data and fewer compliance requirements highlights several back office areas where AI can add value.

You need a structured approach to identifying your challenges and where AI can add most value - what are the priority challenges, what are the quick wins (i.e. back office areas) and what is the resulting staged AI roadmap?

The final element of the data (and AI) strategy is to identify and assess how existing AI tools and accelerators such as ChatGPT / GPT 4.0 can supplement and help realise your objectives.

References

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