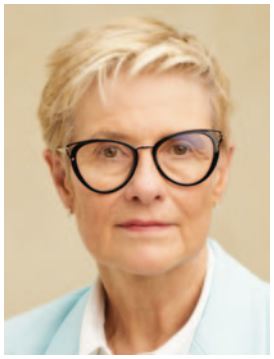
EMBRACING AI TO SUPPORT EARLY DIAGNOSIS: ROYAL COLLEGES PUBLISH SHARED ACTION PLAN



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The NHS has a diagnostics problem. A growing, ageing and increasingly unhealthy population means that more people need tests and scans analysed than the NHS has capacity to deliver. Whilst the demand for diagnostic imaging is rising by 5% per year, the radiology workforce is only growing at about 3% per year. Pathology is also facing an acute workforce shortage, which is being compounded by a lack of training places to match the attrition rate of consultant posts. So it is no surprise that there has been much discussion about the scope to boost diagnostics capacity with digital technologies, including artificial intelligence (AI).

Radiologists are specialist doctors who interpret medical images to diagnose, monitor and treat disease they also perform procedures such as biopsies. Pathologists are doctors and scientists who play a crucial role in the diagnosis of disorders affecting every organ of the body, from before birth to after death. Our two specialties are together responsible for nearly all diagnoses made in the NHS. The AI revolution holds much potential to ultimately benefit patients. However, to implement AI solutions effectively, we need IT systems ready for AI applications and the people to use them.

WHERE AI COULD TAKE US – THE IDEAL CANCER PATHWAY

The promise of AI is huge. Take the cancer pathway. We would like to paint you a picture of what the ideal, AI-integrated pathway would look like for patients.

Someone who is worried about a lump uses AI-enabled digital symptoms checkers or participates in AI-enhanced screening programmes, which detects their cancer at an early stage. "Smart" patient appointment systems mean they see their GP, and then quickly get referred to hospital or for tests.

AI tools in radiology improve the accuracy and speed of image reporting. Likewise, AI tools in pathology could improve pathologists' accuracy and efficiency, prioritising cases needing rapid assessment – therefore getting patients diagnosed quicker.

Using AI tools to help speed up diagnosis means that the patient begins treatment far sooner. "Smart" rota systems cut down the number of missed appointments and mean the patient receives their first treatment as soon as possible. AI tools in radiotherapy aid with the treatment planning process, which means the patient receives the optimum dose of radiation, targeted accurately at the tumour and avoiding healthy tissues. The tools save consultants' time which allows them to spend more time with patients. AI helps the patient's doctors generate written reports and letters, so the patient is kept informed of their progress. Because of all this, the patient's cancer is treated much earlier, they have a much better chance of cure and of going on to live many years in full health. AI systems can also be designed to fast track the huge array of genetic information that genomics now offers. Machine learning could help design personalised cancer therapies using some of the new drugs

being developed that offer significantly better outcomes than before.

Of course, the cancer pathway is only one of many pathways in which AI could play a substantial role. Much of the technology described above exists already but we are a long way from being able to put it into practice and there is a huge amount to do if we are to get there.

GETTING THE BASICS RIGHT – IT INFRASTRUCTURE

The most important barriers that prevent the implementation of AI are IT infrastructure and staff capacity. NHS IT infrastructure is largely unfit for purpose. Not only is it highly disjointed, with individual organisations operating with different systems, but it is also ageing and unreliable. Our doctors spend hours waiting for computers to turn on or for IT problems to be resolved. Often, AI applications require cloud compatibility, which is in many cases lacking.

This issue is a particular problem in pathology, where only a handful of Trusts in England are fully digitised, with the others still physically posting glass microscope slides around the country. Digital pathology involves the sharing and interpreting of pathology information in a digital environment. Digital pathology slides are created when glass slides are scanned to create a high-resolution image that can be viewed on a computer screen or mobile device. This is a huge problem, as before AI can be considered for use in pathology services, there needs to be investment in the technology needed to create and store digital images. Digital images not only enable cases to be transferred rapidly across pathology networks but are also used to train algorithms to assist with diagnostic process. Embedding digital pathology will lay the foundation for the adoption of AI in diagnostic services. Without it we cannot harness these benefits.

GETTING THE BASICS RIGHT – STAFF CAPACITY

The current lack of radiologists and pathologists is a significant limiting factor to speedy implementation. This is true for any kind of innovation but is especially the case for AI integration. There is currently a 29% shortfall in the consultant radiology workforce, which means limited capacity to spend on service improvement projects. Similarly, there is an estimated 24% vacancy rate among cellular pathologists and an estimated further 22% are predicted to retire within the next five years. Moreover, the NHS does not have enough data scientists, systems architects, and software engineers to facilitate the rollout of AI tools at a national scale.

GENERATING THE EVIDENCE

Another essential building block will be generating the evidence that AI applications work in practice as intended. This is essential if we are to address the understandable concerns many have about the use of AI in healthcare. This needs to happen throughout the AI algorithm's journey from development to routine clinical use. Appropriate mechanisms need to be established to assess real world performance of the technology before it gets introduced. For instance, it is very important to know what clinical information the AI was trained on. This is because differences between this and the data that you intend to use the AI on can cause the algorithm to work very differently. At the other end, once AI is in routine clinical use, its performance must be continuously validated. Elements in the AI's environment can change, such as the machines used to take images or the software it interacts with. This could affect the AI's performance, and hence patient outcomes. Establishing the right frameworks to generate evidence and monitor performance is crucial. It will require coordinated work from government, institutions like NHS England, NICE, NIHR, the medical Royal Colleges and others.

BRINGING PEOPLE WITH US

Evidence generation is also an essential step in bringing people with us. The adoption of AI into healthcare is undoubtedly a major shift and is vital that both clinicians and the public are aware it is taking place and happy with how it proceeds. Generating evidence of safety and efficacy is one part of this. Another factor is to ensure that clinicians are actively involved in AI implementation projects. The introduction of a tool will affect the entire healthcare ecosystem, and all staff affected need to be involved in decision making. For patients, it will be essential that healthcare providers communicate openly and clearly, setting out what changes are happening and what it means for them. Studies suggest that specific concerns arise around the use of their data and preserving the human factor in care. These need to be tackled head on.

AMBITION TO MEET THE CHALLENGES WE FACE

We need to be forward thinking and to plan now for the change we want to see in the next five to ten years. AI will not automatically free up clinicians' time and bring down waiting lists. Nor will it replace the need for clinical and medical staff.

Benefits will only be realised if we implement AI effectively, and if we are clear about what our goals are in pursuing AI-enabled care. If the aim is to enable radiologists and pathologists to analyse and process more scans and tests within a specific period, then this needs to be reflected in updated job plans, staffing rotas and organisational strategies. If the aim is to increase the amount of time clinicians spend directly caring for patients, then this too needs to be planned for.

We must embrace innovations to boost capacity, but we can only do this by modernising our IT systems and expanding our clinical and digital workforce. Digital transformation alone will not suffice. We need to take a system-wide approach. This may be an ambitious task. But our ambition needs to match the scale of the challenge we face. Our Colleges are ready to work constructively with health decision makers to support initiatives that will address the challenges and unlock the benefits we have identified. ■