

Embracing AI to support the NHS in delivering early diagnoses

Report from a meeting at 10 Downing Street, 30 October 2023

Background

On 30 October 2023, the Royal College of Radiologists (RCR) and the Royal College of Pathologists (RCPath) co-chaired a meeting at 10 Downing Street to discuss the role of artificial intelligence (AI) to support the medical workforce in delivering early diagnoses.

Radiologists are specialist doctors who interpret medical images to diagnose, monitor and treat disease. Pathologists play a critical role in the diagnosis of disorders affecting every organ of the body, from before birth to after death. 95% of clinical pathways within the NHS rely on pathology services, with millions of tests performed every day.¹ These two diagnostic specialties are at the forefront of adopting AI into the NHS.

Following introductions by the previous Secretary of State for Health and Social Care, Steve Barclay MP, Dr Katharine Halliday, President of the RCR, and Dr Bernie Croal, President of the RCPath, there were a series of presentations on the use of AI in radiology and pathology. These were followed by an open discussion. Presentations were delivered by: Professor David Baldwin, Adviser to the UK National Screening Committee; Dr Ellie Dow, Consultant in Biochemical Medicine, NHS Tayside; Dr Hugh Harvey, Managing Director, Hardian Health; Dr Tim Horton, Assistant Director, The Health Foundation; Dr Anne Kinderlerer, Digital Health Clinical Lead, Royal College of Physicians; Dr Qaiser Malik, Medical Director, Membership and Business, RCR; and Professor Darren Treanor, Digital Pathology Lead, RCPath.

NHS services are under serious pressure, so it is vital that we embrace innovation that could boost capacity. Tackling bottlenecks at the diagnosis stage will help patients receive treatment faster. AI could facilitate this, leading to shorter waiting lists and better outcomes for patients. Nonetheless, much needs to be done if we want to realise the benefits of AI.

Radiology

Radiology is at the forefront of AI in the NHS, with many applications already in use. Demand for diagnostic tests is far outstripping workforce growth, with a 29% shortfall in the consultant workforce.² AI holds much promise to help solve this problem. It could be used to highlight abnormalities on medical images, or to prioritise those images a radiologist should review immediately. However, several factors need to be addressed to allow for AI's adoption into radiology services at scale.

¹ National Institute for Health and Care Excellence (2021), "NICE impact diagnostic pathology". Available at: <https://rb.gy/zefb37>

² RCR, Clinical Radiology 2022 Workforce Census. Available at: <https://rb.gy/c7xv9b>

Pathology

While many cellular pathology services have embraced digital pathology, most still rely on microscopy, rather than benefitting from the advantages of digitised working. There is great potential for AI in this field of pathology, which is driving significant research interest, with at least one AI application for grading prostate tumours currently being trialled. There exists huge scope in blood sciences for machine learning to use the data from the billion-plus blood tests performed each year to direct more appropriate and efficient patient pathways. However, progression of AI within these two areas relies on rapid expansion of digital pathology and the implementation of modern, interoperable laboratory computer systems.

Case study: AI driven blood science algorithms – Intelligent liver function testing (iLFT)

iLFT is an automated system designed to improve the early diagnosis of liver disease.

The issue

- Serious liver disease is challenging to diagnose in primary care. 70% of patients with liver disease initially present with liver failure, and of these, 25% die within 60 days.

The opportunity

- Algorithmic processes can enable the correct testing of patients with potential liver disease as soon as they present to their GP.
- iLFT identifies the right patients for specialist assessment, speeding up referral, diagnosis, and disease management, leading to early intervention.

What is needed?

- Discussions with the Department of Health and Social Care on the national rollout of the iLFT, and a health economics evaluation by the National Institute for Health and Care Excellence (NICE).
- Investment in IT and staff to interrogate the 1.5 billion lab tests performed each year, as current systems lack interoperability and machine learning. This could be cost-neutral overall, given the £17 billion estimated 5-year spend on liver disease.

Case study: AI in the lung cancer pathway

The issue

- Lung cancer is the commonest cause of death due to cancer, killing more than breast and bowel cancer combined. The way to improve this is through earlier and faster diagnosis.

The opportunity

- A screening programme for lung cancer has been approved and a pilot is being converted to a national programme in England, with plans for the other UK countries.
- The programme uses AI algorithms to assist the radiologist in detection and measurement of pulmonary nodules - small growths in the lungs, which may be lung cancers. Accurate detection and measurement of these nodules is challenging without AI assistance.

Future potential

- Assessment is needed to test if the algorithms used in the programme ultimately reduce the time to reach a diagnosis and improve patient outcomes. NICE has recommended that this evaluation done, and the LungIMPACT trial is investigating the issue.

Recommendations: our shared plan of action

We welcome the Government and NHS England's (NHSE) action to date to implement AI in diagnostics. However, there is more to be done. We have developed a shared plan of action for the future of AI in diagnostics, which will require coordinated work from Government, the NHS, healthcare professionals, industry, and the public.

Government should:

- Develop a plan for the robust validation of AI algorithms, which must include the provision of Secure Data Environments (SDEs). Funding will be needed to both deliver the infrastructure and to enable the collection of the necessary data.
- Establish standard processes for the implementation of AI applications in the NHS, so individual NHS organisations can avoid unnecessary duplication of effort.
- Establish professional standards for the audit and quality assurance of AI tools in healthcare settings, to be performed at regular intervals following implementation.
- Continue to implement the NHS Long-Term Workforce Plan recommendations for recruitment and take further action to improve staff retention in the immediate term. AI applications will only yield positive results if we have the staff to use them.
- Support NHSE to recruit and train clinical staff in the assessment, implementation, and evaluation of AI algorithms.
- Appoint an organisation to be responsible for conducting health economics evaluations of AI tools. The National Institute for Health and Care Excellence (NICE) are best placed to carry out this work.
- Implement the Hewitt Review's recommendations for the recruitment and retention of Digital, Data and Technology (DDaT) staff into the NHS.
- Support NHS pathology services to become fully digitised. We estimate £200-£300 million over five years would be required to reach the goal of full digitalisation.
- Continue discussions between the Department of Health and Social Care and the iLFT development team to explore national implementation of the iLFT, and refer the iLFT to NICE for a health economics evaluation.
- Continue and expand existing public education work on AI.
- Address the issues of liability and responsibility with regards to AI diagnostic tools. NHS Resolution and the General Medical Council (GMC) will play a role in establishing where clinicians' responsibility for the effects of AI applications in healthcare begins and ends.

NHS England should:

- Simplify and standardise information governance processes to speed up the rate of implementation of AI. NHSE should support imaging networks to formulate comprehensive Data Protection Impact Assessment (DPIA) forms for each AI use case, which could then be shared with individual organisations.
- Collect data and learnings from current and upcoming AI implementation initiatives, such as the AI Diagnostic Fund. Bodies such as NICE will be crucial for doing this work.
- Expand the AI use-cases under assessment in future deployment pilot projects, beyond the current primary focuses of stroke and chest X-rays.
- Set up audit processes to collect real world data on AI applications to assess their long-term

health effects.

- Continue the existing work to establish expert teams, as part of the Frontline Digitisation Programme, to assist individual organisations or Integrated Care Systems (ICSs) to implement AI applications, according to nationally agreed and standardized processes.
- Expand the NHS Digital Academy to ensure all clinicians have access to AI training. This training should cover assessment, implementation, audit and service evaluation, data security and information governance, and ethics.
- Engage all stakeholders, particularly industry, in dialogue to support safe access to well-curated data, to promote AI algorithms that are reflective and inclusive of the UK population.
- Develop a programme of work to predict how healthcare professionals' ways of working will change with the widespread adoption of AI. The medical Royal Colleges and healthcare think tanks should be closely involved with this work.

Medical Royal Colleges should:

- Develop their AI educational offer to their members. This should include updating specialty training curricula and producing learning programmes designed for clinicians involved directly in the commissioning and implementation of AI tools.
- Develop clinical guidelines as new AI tools come into use within the NHS, setting out best practice for implementation and shaping clinical pathways. These should clarify the evidence of the worthwhile clinical impact of the AI tools.
- Support the regulation of AI by developing robust audit processes for AI tools.
- Work with regulatory bodies to assess the value of promising AI tools and identify evidence gaps. For example, the Royal Colleges should work with NICE by recommending particular AI use cases to undergo evaluation of costs and benefits.
- Facilitate dialogue between healthcare professionals and industry, to ensure that the development of AI applications is focused on what is most clinically useful for the NHS.
- Support their members to speak to their patients and the public about AI in healthcare.

Recommendations to all involved:

- Identify and remove the risk, so far as possible, that existing health inequalities are exacerbated using AI applications by implementing the recommendations above.
- Ensure that medical professionals, their representative bodies, and other regulatory bodies, continue to be involved in the development of processes, procedures, and standards for the rollout of AI into the NHS.

We would like to thank Professor Ray Powles and Lord Bernard Ribeiro for convening the event, and the Secretary of State for hosting our discussion. We are grateful also to Dr Sarah Clarke, President of the Royal College of Physicians, for her attendance and participation. We look forward to ongoing collaboration to harness the benefits that AI can bring to healthcare diagnostics.

Please see the supplementary material for a summary of the discussion and for further details on each of our recommendations.