

Overcoming Barriers to AI Implementation in Imaging

Outcome of an RCR Expert Stakeholder Day

Summary of Recommendations:

We would like to see NHS England leading on the implementation of the following recommendations and would be pleased to work with them to take this important work forward.

1. Develop a single, national information governance set of policies, or policies framework.
2. Convene regional/national expert teams to help deploy AI in trusts.
3. Focus on a network-level approach to facilitate the rollout of AI.
4. Make revenue funding for AI available to each region, for which trusts or local systems (such as imaging networks) can bid.
5. A greater emphasis on providing guidance and education to support AI deployment.
6. Gather more evidence on patient outcomes and the health economic impact of AI deployment.
7. Speed up a cloud-first national strategy.

Introduction

Artificial Intelligence (AI) tools have long been anticipated as potentially transformative for diagnostic imaging. At a time of unprecedented pressure for the NHS and our specialties,^{1,2} the potential is great for AI tools to render processes more efficient, freeing up valuable time for staff to focus on patient care and to make best use of their radiology reporting time.³

Presently, there are some limited AI tools in clinical use across NHS trusts, with many more available for deployment or in development. However, both trusts and AI vendors have expressed frustration at the many barriers to implementation they face. The Royal College of Radiologists (RCR, the College) convened a stakeholder day on 27 April 2023 to understand these barriers and identify solutions to them, bringing together leading clinical radiologists, people implementing AI within NHS trusts and imaging networks, AI vendors, and NHS England (NHSE) leaders. (A list of delegates can be found in Appendix 1.)

Prior to the day itself, AI vendors were surveyed on their experiences of implementing their tools in the NHS. They were asked to share which barriers they had encountered, why these were problematic, and to suggest possible solutions. On the day, delegates formed discussion groups; each was given a thematic barrier to analyse. Through a series of round-table discussions and group feedback sessions, the delegates developed a set of possible solutions, which then went through a prioritisation exercise. Discussions were held under the Chatham House rule.

1 The Royal College of Radiologists, Clinical Radiology Census Report 2021. Available at: <https://rb.gy/oljei> (Accessed May 2023)

2 The Royal College of Radiologists, Clinical Oncology Census Report 2021. Available at: <https://rb.gy/q6t9z> (Accessed May 2023)

3 The Royal College of Radiologists, RCR position statement on artificial intelligence. Available at: <https://rb.gy/m5qaa> (Accessed May 2023)

Barriers to implementation of AI tools

Delegates in groups were each tasked with discussing one barrier identified in the survey and identifying solutions. These were then fed back to the collective, after which the process was repeated for a different barrier. The discussions gave the opportunity for each barrier to be fleshed out, with specific issues explored in greater detail.

1. Information governance

- Delegates agreed that existing information governance processes are complex and time-consuming. Moreover, they vary considerably between individual trusts. This can lead to a duplication of effort on the part of the vendor and/or the trust, slowing or impeding implementation. The various Data Protection Impact Assessment (DPIA) forms used by trusts are a clear example of this problem.
- Vendors often do not know what their obligations are regarding information governance. Similarly, trusts do not always know what is required for the adoption of AI tools from an information governance perspective. This creates more work for some AI vendors than is necessary – but could also potentially lead to trusts delaying information governance approval due to lack of certainty or clarity concerning the requirements.
- Related to this, delegates discussed the problems arising from GDPR regulation and its implementation. Specific issues were shared, such as the hosting of data on servers in the USA being unacceptable to the Information Commissioner's Office (ICO), constraining AI vendors, and a lack of clarity regarding whether pseudo-anonymisation of data can take place outside of trusts.

2. Lack of evidence

- Trust staff, be these information governance leads, IT staff or clinicians, often lack knowledge of AI solutions. Delegates agreed that trust leadership can be risk averse, due to a lack of confidence in evaluating potential and ongoing AI projects. This was attributed to both a lack of expert knowledge at trust level, and to the lack of national/regional guidelines and approved processes for choosing, implementing, and assessing the performance of AI tools.
- It was generally agreed that, as AI is a fledgling industry, challenging negative perceptions of AI can be a major difficulty. There is doubt among some clinical radiologists as to whether AI tools will positively affect their working lives.
- Delegates agreed that there is currently little awareness of what tools have been deployed, in which trusts, and to what outcomes. It was felt that if greater awareness of success stories could be developed, trust and confidence in AI usage would increase and implementation would become easier.

3. IT systems and staff capacity

- Several specific barriers to implementation related to trusts' IT infrastructure, the expertise of their IT staff, and the capacity of both their IT staff and their clinicians.
- IT systems in trusts are highly variable. They are generally under-resourced and rely on ageing software that is often incompatible with AI tools. If a wholesale upgrade of a trust's IT systems is required, those trusts may be less likely to give the green light to an AI solution.
- Similarly, IT systems are fragmented and disjointed, with different systems operating concurrently, creating challenges to inter-system communication. Integration of AI tools with multiple existing systems is a challenge. Trust IT staff may be lacking in the expert knowledge required to assist in their deployment in their trust. Many trusts lack specific individuals tasked with service improvements to IT systems, such as Chief Information Officers or Systems Architects.
- Some trusts have had success implementing AI techniques, having taken a proactive approach, overseen by a multidisciplinary committee with senior-level involvement. They reflected that involving IT departments early in the adoption process is critical to success.
- However, many trusts lack the resources to upskill their IT staff in this area. This means the AI vendors often perform the integration and onboarding, at an additional cost to the trust.

4. Funding

- Delegates highlighted the challenge trusts face in funding AI projects.
- The large up-front investment in money and time required to successfully deploy an AI tool can be a hard sell. Project leads and AI vendors often struggle to secure the buy-in of trust leadership. It was suggested that many trust leaders view AI tools as "nice to have," as opposed to essential service improvements. Given the financial and workforce pressures trusts are under, other costs and projects are prioritised.
- Linked to this, AI funding requests are often reviewed on a case-by-case basis as opportunities arise, rather than being driven by a proactive strategy based on the desired impact (such as improving productivity/throughout) – making it difficult to justify the investment.
- Currently, there is little ring-fenced funding for AI provided by NHS England, or other national or regional healthcare bodies.¹ Delegates spoke of trusts with the desire to introduce AI tools, but, owing to insufficient finances, are unable to do so.
- Moreover, funding for software must come from a trust's revenue budget, which tend to be far more constrained than a trust's capital budget.
- Delegates linked the funding challenges they had experienced to the lack of expert knowledge. This lack of knowledge of AI tools' successes, alongside the large upfront costs to deployment, can make it hard to develop a convincing business case.



¹ NHS England list several discrete sources, but there remains no general, UK-wide funding stream for the development and deployment of AI tools. NHS England, Artificial Intelligence (AI) funding streams. Available at: <https://rb.gy/ekwxx> (Accessed May 2023)

Suggested solutions:

In their roundtable groups, delegates were asked to draw up practical solutions to the barriers they were discussing and present these to the collective. These were then discussed further, grouped together by theme, and refined. At the end of the day, delegates voted on those next steps that they felt they would find most useful in overcoming the barriers. These were as follows:

1. Develop a single, national information governance set of policies and frameworks.

- AI companies felt that a single process and set of documents used across all trusts would save time and effort. NHS trusts felt that having national documents that they either used in their entirety, or used as a starting point, would save them time, and give greater assurance. This solution was the most popular with delegates.
- This single set of documents would reduce the bureaucracy and opacity of current processes. An example of this would be the creation of a single DPIA policy for England, covering all trusts. Delegates noted that a similar process happened during the Covid-19 pandemic with the vaccine programme.
- Policies should be developed that ensure data security but simultaneously allow for efficiency in data processing. For example, it would be beneficial if ways could be found to improve and standardise the de-identification of data where required.

2. Convene regional/national expert teams to help deploy AI in trusts.

- AI companies felt that having expertise, knowledge and manpower in-trust would enable them to work with trusts more rapidly and effectively to deploy solutions. Trusts agreed that an expert team would confer greater expertise and capacity for deploying solutions.
- The proposal is for teams of specially skilled, multi-disciplinary staff who could progress from trust to trust to help install and onboard new software, as well as training up the local teams.
- Later down the line, a national training programme for best practice could be developed.
- Delegates agreed that to be successful, the activities of the expert team should be the primary responsibility of its members. It should not be undertaken in addition to their existing roles. Similarly, the team would require the necessary mandate and the funding to carry out its operations effectively.
- The previous rollout of Picture Archiving Communications Systems (PACS) may be a useful case study to consider. Indeed, PACS staff would need to be involved in the expert team.

3. Focus on a network-level approach to facilitate rollout of AI.

- Both AI companies and NHS trusts felt that having a strategic, multi-trust approach would enable faster progress, joined up thinking, and pooling of expertise.
- Networks could aid in the sharing of data, including that of existing tools in use elsewhere in the country.

4. Make revenue funding for AI available to each region, for which trusts or local systems (such as imaging networks) can bid.

- There should be ring-fenced funding for AI tools. Accompanying this should be a framework outlining how trusts should apply for funding. Vendors felt that fast-tracked funding for AI pilot projects would enable them to implement solutions more rapidly, and thus demonstrate their value to other trusts.
- Delegates discussed what the fund should include. Prominent features included: (I) a framework for funding applications and (II) a table of performance of AI tools, with evidence to show their effectiveness.
- Delegates felt that in any table of performance, care would need to be taken to avoid giving individual vendors a commercial advantage over others.

- Trusts and Integrated Care Boards (ICBs) could form AI steering groups to ensure adoption of AI is prioritised and pursued in accordance with any AI funding frameworks introduced. Such a framework would educate trusts about what tools they could purchase to help their local hospital(s) achieve specific goals or solve specific problems.
- This central ring-fenced funding could be deployed based on regional strategies, following the CORE20PLUS5 model. For example, the funding framework could provide guidance for tackling several common challenges (such as throughput in radiology departments), paired with a particular local issue.

5. A greater emphasis on providing guidance and education to support AI deployment.

- Delegates agreed there is a desire for a respected, independent organisation such as the RCR to educate clinicians and wider trust staff on AI, as well as to provide a wider suite of national guidance.
- The RCR is already developing guidance on validation and benchmarking of AI in lung imaging, and a registry of deployed AI tools in the UK. Audits of the performance and outcomes of deployed AI applications will follow.
- Other educational tools that could be created include: a glossary of AI terminology; guidance for information governance leads; support for writing business cases; and “speed dating” forums dedicated to getting AI vendors, clinicians, and trust leadership together in the same room.
- There is also a role for NHS England to facilitate the upskilling and education of trust leaders. Delegates felt it was important to develop a national framework for quality assurance (QA) of AI solutions in current use. This would mean that, rather than auditing AI solutions on a voluntary basis, there would be a framework for regular reassessment. This would either be made compulsory or, if still voluntary, would lead to accreditation.

6. Gather more evidence on patient outcomes and the health economics of deployment.

- To improve the business case for AI, and to ensure beneficial clinical outcomes, delegates felt that they needed more evidence to show the ultimate patient outcomes of using AI, as well as the health economics of AI deployment.
- Benefits of AI in imaging can often be felt across the hospital. However, capturing these wider benefits in a systematic, measurable way is often difficult. Nonetheless, it can be vital to building a positive health economic case.
- It is often beyond the capability and financial viability of a single trust to undertake the economic evaluations needed to gather this evidence. As such, a centralised effort to develop the health economic evidence is needed.
- Success stories of AI tools, conveyed in language trust leaders will understand, would encourage trusts to take up those AI tools. It is not only about sharing evidence of their success, but is also about the way in which that success is presented.

7. Speed up a cloud-first national strategy.

- Issues integrating AI tools with existing hospital IT systems are largely removed when IT systems move to the cloud. Delegates agreed that a sped-up transition to the cloud would remove a significant barrier to implementation.
- The efforts already underway in moving trust IT systems to the cloud were recognised. However, while some trusts already have IT systems in the cloud, and there is a national strategy to migrate all trusts to the cloud, progress has overall been too slow.
- This is a difficult and complex undertaking and without a more concerted effort centrally, it will be many years until a significant proportion of trusts have cloud-based IT systems, delaying the associated benefits of AI deployment.

Conclusion

While there has been some progress at deploying AI imaging tools in the NHS, delegates recognised that setting up and implementing these new technological developments is complex. If we are to realise the benefits of AI imaging tools within the foreseeable future, in a coordinated and managed way, a concerted effort is needed to overcome the barriers and implement the solutions highlighted above.

The RCR will work with NHSE, trusts and AI companies to make progress on the barriers. The College calls on all those with a part to play in progressing the solutions to do so. Another stakeholder day will be held in early 2024 to evaluate any progress made in achieving the solutions identified.

Appendix 1: Delegates

RCR AI Committee

Andrea Rockall, Clinical Chair of Radiology, Imperial College
Katharine Halliday, RCR President
William Ramsden, RCR Vice-President, Clinical Radiology
Oliver Reichardt, RCR CEO
Krit Dwivedi, University of Sheffield; Wellcome Trust Clinical Research Fellow, AI in medical imaging
Dan Fascia, Chair, Radiology Informatics Committee
Dominic Cushnan – Director of Imaging Development, NHS Transformation Directorate
Susan Shelmerdine- Consultant Radiologist and Hon Associate Professor

NHS

Richard Goodwin – Norfolk and Norwich University Hospitals NHS Foundation Trust
Ashley Shaw – Cambridge University Hospitals
Simon Hadley – Great Ormond Street Hospital
Kim Robertson – NHS England
Richard Smith – NHS England
Rhydian Phillips – NHS England
Rhidian Bramley – The Christie NHS Foundation Trust
Amruta Talwalker – Wrightington, Wigan and Leigh NHS Foundation Trust
Simon Rickaby – South West London Acute Provider Collaborative
Geraldine Dean - South West London Acute Provider Collaborative
Chris Sleight – Northern Care Alliance NHS Foundation Trust

Sarim Ather – Oxford University Hospitals NHS Foundation Trust
Andrew Scott – Milton Keynes University Hospital NHS Foundation Trust
Andy Callow – Nottingham University Hospitals NHS Foundation Trust
Precious Ojiako – Nottingham University Hospitals NHS Foundation Trust
Jaqualine Moxon - Nottingham University Hospitals NHS Foundation Trust
Mark Salmon – NICE
Jonathan Crookdake – University Hospitals of Derby and Burton NHS Foundation Trust

AI Vendors

Chris Whitton – Contextflow
Imran Siddiqui – Bayer PLC
Daniel Jones – Gleamer
Paul Idelson – Milvue
Jonathan Nash – Kheiron Medical Technologies
Annie Arkle - Kheiron Medical Technologies
Toby Tarczy – Imera AI
David Bowen – deepc
Surabhi Srivastava – Qure
David King – Aidence
Graham King – Annalise.ai
Mike Burns – AIDOC
Jamie Chow – Blackford
Bastien Manceau – AZMED
Subhashis Ghosh – Collective Minds
Anjum Ahmed – Agfa Healthcare
Donna Savage – Guerbet
Julia Waller – Philips (carestream)
Krishna Boddu – Mirada Medical Ltd

Appendix 2: Preliminary survey results

To focus discussions on the day of the workshop, the RCR surveyed AI providers to learn the main barriers they had experienced in implementing their solutions in the NHS, as well as any potential solutions they had identified. Fifteen providers completed the survey. Many of these currently have solutions in place in various NHS trusts. The fifteen providers each offer a range of solutions. In order of most to least common, these are: detection of findings (93% of respondents), segmentation and automated measurements (80%), workflow triage and prioritisation (80%), automated reporting (60%) and image enhancement or artefact reduction (20%). Various other solutions were also reported less commonly.

Question: In your experience, what are the biggest barriers to adoption of AI imaging solutions in the UK and NHS?

Respondents were presented with a multi-select list of the below barriers. The percentages here refer to the proportion of respondents who selected each barrier.

- Limited NHS funding – 87%
- Limited access to IT/technical expertise – 80%
- Accuracy/reliability concerns – 60%
- Lack of awareness of AI among trusts – 53%
- Regulatory and legal barriers – 33%

The respondents were also presented with an 'Other' category. They gave various free-text comments. Some of the most common answers referred to:

- GDPR: varying interpretations
- Bureaucracy (e.g. budget required before project begins)
- Staff shortages/overworked – unable to take on new projects
- Lack of HTA endorsement
- Lack of national strategy/guidance for commissioning and deployment

Question: More generally how have you found working with the NHS?

When asked how they had found working with the NHS, most respondents referenced challenges like the slow speed of decision making, the opacity of NHS processes, and the difficulty in getting projects off the ground. Where projects are implemented successfully, most respondents reported a positive experience and feedback from users. There were mixed sentiments regarding the levels of interest and enthusiasm among NHS staff. Some respondents reported great enthusiasm among clinicians, but many noted that these are often too busy to focus on service improvements like AI tools.

Main specific barriers encountered when deploying AI into the NHS?

Respondents were asked to specify their own barriers to implementation (up to three), along with a brief description of the barrier and a suggested solution to it. All respondents named two barriers, and 73% of them named three.

To summarise the results, we grouped the responses into several broad categories. Many responses referred to more than one barrier, however, so the below figures should be seen as an approximate guide only. All sets of responses were compiled together and categorised. The percentage figures show the number of answers in each category as a proportion of the total number of answers. The same process was followed to categorise the various suggested solutions. These main barriers formed the focus of the discussions at the stakeholder day.

Types of barriers:

- Lack of evidence – 23%
- Funding – 21%
- Information governance – 21%
- IT – 15%
- Staff capacity – 8%
- Trust leadership – 8%

Other, less commonly identified barriers included the challenges of GDPR legislation, data access, and a paucity of national or regional strategies for adopting AI tools.

Suggested solutions – groupings:

- National guidance / deployment frameworks – 31%
- Ringfenced AI funding – 28%
- Education at trust level – 18%
- Reform IT governance processes – 15%
- Staff capacity/job planning – 8%