Academy of Medical Sciences' submission to the House of Lords Science and Technology Committee inquiry on Innovation in the NHS: personalised medicine and AI

April 2026

Summary of response:

The Academy of Medical Sciences is one of the UK's four National Academies, and is the independent, expert voice of biomedical and health research. This response draws on the experience of our Fellowship of leading researchers, and relevant recent Academy outputs.

The Academy is developing a longer-term programme of work on the responsible, effective and equitable use of AI and data across the biomedical sciences. The scope of this response is therefore limited to findings from existing reports and consultations, but will evolve into a more comprehensive set of policy positions over the course of the year.

Opinions expressed in this report do not necessarily represent the views of all Fellows, or the entire Academy.

There is a powerful opportunity to support AI within UK medical sciences. AI in personalised medicine and genomics is already showing great potential for improving our understanding of disease and treatments; saving time and resource for the NHS; and improving health and economic outcomes. A next step is to consider how the UK can play to its unique strengths (as with the scale and coverage of NHS data) to build our national capability in AI.

However, several technical, structural, and social challenges must be overcome to realise the full potential of AI applications in personalised medicine:

- Greater transparency and explainability in models, and diverse, high-quality, linked datasets are required to fully accelerate development and adoption.
- The effectiveness and safety of predictive AI requires careful evaluation.
- Complex and inefficient systems for managing and accessing health data remain a barrier to effective and timely access by healthcare professionals.
- For the NHS to properly enable AI adoption, basic digital systems must be improved. IT and AI infrastructure need to facilitate better interoperability of, and access to, data by the NHS workforce.
- AI literacy and trust need to be greatly improved among healthcare professionals and the public. For clinicians, frontline pressures, a risk-averse NHS culture and a fragmented procurement system still limit uptake and understanding.
- However, even where there is interest in and understanding of AI, clinicians (particularly clinical academics) need to be supported with the proper time and resource to research and innovate.

The findings we have collated here suggest the Committee's attention could be best focused on the following asks of key stakeholders:

- **Government:** Invest in the necessary skills, data infrastructure, regulation and digital systems, while strengthening cross-sector links between medical

research, industry and the NHS. Otherwise, we risk losing global competitiveness.
- **Government, health data groups and patient groups**: Enable opportunities for meaningful, sustained patient and public involvement in decisions about data.
- **NICE:** Take a holistic approach to capturing the full downstream benefits to patients, to fully inform cost evaluations.
- **MHRA and other regulators:** Offer clear, risk-proportionate regulatory frameworks, supported by sufficient resource, to reduce uncertainty and encourage innovation.

Section 1: Personalised Medicine and AI: the science and technology

Personalised medicine and AI: the scientific background

1. What is the current state of the science underpinning personalised medicine – including genomics, AI-driven diagnostics, and advanced genomic therapies? What are the most significant near-term opportunities for patients to benefit in the NHS?

Academy answer

1. The Academy has heard that some applications of AI in genomics with the greatest potential include:
- Approaches to better understanding the role of genetic variants in disease by integrating multiple types of data, for example identifying their role in developmental disorders, and providing prognostic information and guiding choice of treatment in cancers. (AI is already helping to collate and integrate genomic data to guide prognostic information and choice of treatment for cancer).
- Integrating multiple types of 'omics' data (largescale data on gene activity, cellular proteins and metabolites) to open up new opportunities to dissect the underlying mechanisms of diseases. (Already rapidly entering healthcare practices in various settings).
- Analysing and classifying biological images, and to extract information from the scientific literature, creating powerful new ways to connect genotype and phenotype.[1] (AI is already showing great potential in contributing to image analysis in the diagnostic pathway).
- *(See also response to Q2).*

2. Continued adoption and scale up of these technologies needs to be considered alongside careful consideration of technical, practical, and social challenges *(see response to part a) below).* Strong engagement with patients and the public will be necessary to guide the direction of innovation and to ensure that any new applications have public trust and support.

[1] Academy of Medical Sciences and Royal Irish Academy (2024). *Policy workshop on genomics and artificial intelligence.*

a) Where are the major gaps in our understanding that could be addressed through further investment in research and development, and which research projects would you prioritise? What should the National Institute for Health and Care Research (NIHR), the Medical Research Council (MRC), and other health researchers fund to capitalise on this?

Academy answer

3. The Academy's work has not yet explicitly identified specific research projects that would address gaps in scientific understanding. We have, however, heard agreement on the need for measured and evidence-based approach to prioritising areas where AI and genomics could have the greatest positive impact in medical sciences. Such an exercise should ensure that clinical utility is assessed, and whether the potential of AI and genomics can be substantiated beyond any hype or speculation.

4. More broadly, some of the most pressing technical challenges we have heard include:

- The lack of explainability (and transparency) inherent in many AI applications – how AI systems arrive at their outputs is often not understood.
- Current genome datasets are dominated by data from individuals of European descent. This lack of representativeness in genome sequence databases, which are used as training sets for AI, is important since some tools perform poorly when used on data from individuals of a different geographic ancestry.
- The importance of independent validation of tools, including their performance across multiple populations.
- More broadly, innovation should be targeted where it could achieve greatest public health impact, by identifying and incentivising investment in priority areas.[2]

b) What possibilities exist for personalised medicine in the medium and long-term, and what is needed to unlock these opportunities? Are there examples of specific areas of UK practice, or practice overseas, which we should learn from to help deploy personalised medicine?

Academy answer

5. The Academy is developing a longer-term programme of work on the responsible, effective and equitable use of AI and data across the biomedical sciences. We will consult widely with UK and international experts to better understand how to enable the medium and long-term benefits of AI in medicine.

The role of AI in personalised medicine

2. What role could AI realistically play in accelerating the development and reducing the cost of personalised medicine? How close are we to

[2] *Ibid.*

understanding and realising its potential and what barriers need to be removed to fulfil it?

Academy answer

6. Academy Fellows provided some early case studies that illustrate the role AI can play in accelerating the development of personalised medicine. These encouraging examples both show the need for further cost-benefit evaluation of AI in improving efficiencies and health outcomes.

Case study 1 - Breast cancer imaging:
AI can be used to assess the short-term risk from a mammogram to determine whether a supplemental imaging technique such as contrast mammogram or fast breast MRI should be offered. Fellows have published a comparison of these AI mammogram-based risk prediction tools and shown that several are very promising.[3] One combination tool has been used to select women with negative screening mammograms to offer an MRI scan. The ScreenTrust MRI study demonstrated an 8-fold increase in cancer detection.

1. Prediction AI tools need to be tested in the UK in conjunction with AI detection tools.
2. 3D breast imaging - Tomosynthesis will likely replace 2D mammography (current standard) and so the AI prediction tools will be tested in 3D mammography.
3. AI in MRI cancer detection tools are being developed and being tested.
4. Autonomous AI can be used to read screening mammograms with no human reader in up to 40% of cases where there is a very low risk of cancer.

Case study 2 - Lung cancer screening:
The lung cancer screening programme offers low dose CT to heavy smokers. AI to detect solitary pulmonary nodules is used to assist radiologists in the detection of these potential cancers and speed up reading time. Currently it is proving difficult to roll out the lung screening programme due to manpower challenges especially reporting capacity. The adoption of Autonomous AI could increase capacity by 200% by freeing up radiologists to read the abnormal of suspicious cases and the normal cases (the majority read by AI only).[4][5]

a) Where do you think existing AI tools could be most effective at advancing personalised medicine, for example across genomic analysis and drug discovery? Are there standout examples that could be more widely deployed? What is preventing more widespread adoption of promising tools?

[3] Gilbert FJ, *et al*. (2025). *Comparison of supplemental breast cancer imaging techniques—interim results from the BRAID randomised controlled trial*.
[4] Gilbert FJ, *et al*. (2025). *Data and data privacy impact assessments in the context of AI research and practice in the UK*.
[5] Rothwell J, *et al.* (2026). *Performance of breast cancer risk prediction algorithms across mammography systems in the UK screening programme.*

No answer provided

b) How significant are the recent advances in AI to what is possible in personalised medicine? What role do you see for recent developments in AI models for genomics, like AlphaGenome, which promise to more accurately predict the effects of genetic variation on health?

No answer provided

c) To what extent are Government goals – for example, around using AI to accelerate drug discovery – realistic, and what does it most need to invest in to ensure they can achieve these goals?

Academy answer

7. Alongside the promising examples above, other Fellows expressed scepticism about the near-term potential of AI in accelerating the development and reducing the cost of personalised medicine in some contexts. Specifically, we have heard concerns that automatically annotated or algorithmically predicted data in patients without phenotype (current clinical features) is starting to contaminate datasets. This risks a 'snowballing' effect where errors are propagated and seed further error into the system.

8. There is still a significant amount to discover about variants, especially in this predictive context where issues of incomplete penetrance (cases where only a small percentage of people with a variant, e.g. 2%, develop the disease, rather than the more commonly assumed 100%) are of particular importance and currently very incompletely understood.

Health data research infrastructure

3. Personalised medicine depends on large scale genomic and health data being accessible and linked together. What further research infrastructure, in terms of data accessibility, compute etc. – is needed to support the development of personalised medicine and AI? Where are the gaps in current provision? How should the Government help ensure that its health data infrastructure is fit to deliver on this promise?

Academy answer

9. Health and care professionals, researchers and policymakers face many obstacles and delays in accessing, linking and analysing health data in the UK. These barriers arise from the UK's complex and inefficient systems for managing and accessing health data. This can prevent or delay crucial analysis and research and hold back the life sciences sector.[6]

[6] Academy of Medical Sciences (2024). *Response to Invest 2035: the UK's modern industrial strategy.*

10. It is important the Health Data Research Service is given the best chance of success, building upon existing expertise within industry, academia, research funders and the NHS.

11. A joint national health data strategy, guided by the findings of the independent Sudlow Review on health data, should enable the infrastructure, data, governance and services of a reliable, scalable and inter-operable trustworthy health data ecosystem. This should be developed in partnership with DHSC, NHS England, research funders (e.g. UKRI), and the research community.[7]

a) What recommendations would you have for bodies like the Health Data Research Service, Genomics England, and the Genomics AI Network to capitalise on the opportunities presented by these technologies?

No answer provided

b) How effective has the government been at linking together health data through its genomics research projects and through the NHS, and where is further work needed?

Academy answer

12. Longitudinal linkage of data, from exposure to outcome, is a key strength of the UK. Our large genomic programmes are impressive in size – as is our ability to link genetic characteristics to future health outcomes, enabling prediction at scale.

13. To build on this strength, however, and to enable personalised medicine to maximise its impact on the population's health at any scale, predictive biomarkers (whether genetic, imaging or other) need to be fed into GP and hospital information systems, across the UK. We have heard in some cases, it is possible that a suboptimal number of people actually tested for such biomarkers and what data exist are held in fragmented research and clinical systems, often with no feedback loops in place.[8] Care must also be taken to avoid underrepresentation of ethnic minorities in data sets. The scale of testing for existing and emerging biomarkers may need to be increased enormously if precision treatment is to become standard practice.

14. Biomarkers need to be assessed for effectiveness and cost-effectiveness, as with any other technology. That requires longitudinal linked data to identify plausible candidates to guide treatment choices and the implementation of clinical trials to demonstrate efficacy. Fellows cautioned that all of this takes time, and that while AI can help in identifying plausible biomarkers it cannot speed up the measurement of statistically significant outcomes. Larger trials can help to address this.

[7] Academy of Medical Sciences. (2024). *Response to NHS 10-Year Health Plan.*
[8] Bell D, *et al.* (2025). *Access to treatment-guiding biomarkers in the UK: surveys of cancer patients and healthcare professionals.*

c) To what extent does the NHS's digital and IT infrastructure represent a major barrier to the deployment of these treatments, and are the Government's current attempts to address this and ensure interoperability adequate?

Academy answer

15. The Academy has heard the continuing lack of basic digital infrastructure in the healthcare systems of the UK is one of the most significant barriers to the adoption of AI-based health technologies.

16. Some Fellows have raised concerns that attempts from Government to address this have so far not been adequate. For example, despite the recommendations of the 2016 report on 'Making IT work' from the National Advisory Group on Health Information Technology in England, the desired standard of whole-NHS digitisation by 2023 was not reached, and we have heard that many healthcare settings still use paper notes.

17. In addition to the AI infrastructure required, healthcare settings that have not implemented electronic health records are unlikely to have local datasets with which to train AI-based health algorithms. Capital investment and financial incentives (e.g. clear budgets for the subsequent adoption of safe and effective AI solutions) will be necessary for the improvement of digital infrastructure in the healthcare system.

18. Even where digital maturity has been achieved, digital systems used are often not compatible, limiting interoperability and the ability to transfer data between different systems. This increases the cost and effort of any planned scale-up for adopters and developers alike.

19. Interoperability could be considered as a key procurement criterion to ensure standardisation of digital systems across similar healthcare settings. We have also noted that a consistent interface for HCPs would also be useful, to prevent the need for retraining.[9]

d) Health data research is often set back by a lack of public trust in how data is handled. How should the Government address public concerns? Are current data protection protocols and industrial partnerships appropriate?

Academy answer

20. There is a relatively low understanding of AI technologies among the public (and healthcare professionals), contributing to reduced confidence.

21. Negative public perceptions of AI risk undermine the credibility of these technologies and their adoption in clinical trials. Concerns around transparency, accountability, and the perceived 'black box' nature of AI systems further fuel scepticism. Open communication and transparency around how AI is used and

[9] Academy of Medical Sciences and Royal Academy of Engineering (2023). *Accelerating effective and safe adoption of artificial intelligence in the healthcare system.*

assessed, and how it benefits patients and the public, is needed to address these concerns.

22. Improving AI literacy across the system through training and scaling will be key to the adoption of AI and computational models in clinical trials. Clinicians and procurement teams need to be aware of how these models work if they are to be successfully integrated into trial design and delivery.

23. While narratives around AI and computational models in clinical trials are broadly positive, regulators could strengthen these narratives by communicating the benefits to the delivery of research and new therapies. Publishing case studies where AI technologies successfully enhanced clinical trials could help to illustrate the benefits to patients and the public.

24. Regulators should be open about how AI technologies in clinical trials are assessed and approved, including how risk-proportionality is decided. In addition, developers will need to be transparent with regulators about the development process and the validation of algorithms. Regulators could also engage trusted sources (e.g. large medical research charities) to update the information communicated to patients about clinical trials and AI.

25. Journalists, policymakers and opinion leaders could be engaged by Government to build positive media narratives around AI in clinical trials.

26. Effective methods to involve and engage with patients and members of the public about AI in healthcare on a national scale should be identified, drawing on existing initiatives where relevant. This may include a national forum and/or one or more citizens' panels. Organisations such as Understanding Patient Data and Health Data Research UK would be well placed to convene this on a national scale.[10]

27. Consideration should also be given to desired patient outcomes. One Fellow shared their observations on the desired outcomes offered by older people in their studies, including maintenance of independence; avoidance of too many NHS clinics; survival; avoidance of drug side effects. There will be implications for the extent of data linkages required across these. In turn, getting access to such data requires trust in the organisations involved. Effective public, patient and political involvement is needed to obtain the trust, confidence and understanding of the UK's application of these technologies and its responsible interaction with the technology companies commissioned.

The life sciences sector

4. How effective is the UK at translating its strengths in life sciences research into clinically validated personalised medicine and AI tools, and into its industrial base in the life sciences?

[10] *Ibid.*

Academy answer

28. Technical, regulatory, and cultural challenges mean that the adoption and scale-up of AI-based healthcare technologies is currently slow, piecemeal, and variable across the UK. To realise the benefits of AI in health and care more widely, a more streamlined, end-to-end pathway for safe and effective adoption of AI in the healthcare system needs to be developed, with the aim of overcoming these challenges.[11]

a) What are the main barriers in moving personalised medicines and AI from the early-stage research to clinical trials and through to regulatory approval? To what extent is the national infrastructure for clinical trials able to keep up with developments in personalised medicines and AI?

Academy answer

29. In 2025, the Academy held a workshop in partnership with the Regulatory Innovation Office (RIO) on regulating AI and computational models in clinical trials. Key points raised included the need to establish clear regulatory frameworks and guidance, and the need to increase understanding of AI technologies among the public (and healthcare professionals – as discussed in Q3.d)

1. Establishing clear regulatory frameworks and guidance

30. A key challenge raised by participants was a lack of clear guidance or frameworks for the use of AI and computational models in clinical trials. The MHRA introduced a Risk Proportionate Approach (RPA) for Clinical Trial Authorisation (CTA) specifically tailored to trials incorporating AI and computational models, indicating its willingness to be innovative in its approach to regulating these technologies. It has an opportunity to continue building on its clear, risk proportionate frameworks and guidance for the use of AI and computational models in clinical trials. This will increase confidence from industry in the likelihood of trial approval and encourage the adoption of these technologies.

31. Regulators could publish clear guidance on the categorisation of risk for specific AI and computational technologies for innovators, highlighting the distinction between high-risk and low-risk applications. Guidance should include how AI technologies for use in trials might be classified (for example, as medical devices) and a repository of case studies that is regularly updated to provide examples of the types of technologies being approved. This would allow for better informed decision-making by innovators and higher confidence in the likelihood of approval. Participants recommended involving patients and industry partners in the development of any classifications. The UK could also agree on a risk-tiered approach where lower-risk technologies, for example those that automate processes, are approved for use in trials through a streamlined pathway.

[11] *Ibid.*

32. Establishing core principles for approaching the regulation of AI and computational models in clinical trials could help overcome international regulatory fragmentation while maintaining flexibility over specific guidance in the UK to enable forward thinking. Participants suggested agreeing on a common definition of AI (e.g. the Organisation for Economic Co-operation and Development's definition)[12] and clarifying subcategories through a dedicated working group. They also suggested aligning with international data quality standards to ensure data meets the high standards set by bodies like the European Union (EU), International Organization for Standardisation (ISO) and professional medical records organisations.

33. Participants raised concerns about the accuracy of generative AI tools and methods to validate and explain them. AI systems – particularly non-deterministic and generative models – often function as black boxes, where the internal decision-making processes are opaque or inaccessible. This lack of transparency challenges traditional validation methods and makes it difficult to assess the reliability of outputs. To address this, regulators could work with developers to publish guidance that covers validation expectations. Participants suggested that validation should be tailored to the AI's function and trial phase, as the way AI is validated may vary significantly across disease states and phases of a clinical trial.

34. Regulators have an opportunity to encourage innovators to adopt these technologies by establishing a formal, confidential pre-advice meeting structure for AI-enabled trials. Participants suggested this be modelled on the EMA's Innovation Taskforce, and could bring together the HRA and other relevant bodies, such as funders, to clarify ethical and regulatory expectations with innovators early in the process. If the trial appears likely to meet regulatory requirements, it could be approved and progressed to the next assessment phase. In more complex cases, innovators could be offered an airlock procedure to further refine the approach. An airlock procedure could be particularly valuable for companies that are new to using AI and computational models in clinical trials.

35. To enable the adoption of these technologies in trials, regulators must have the skills necessary to evaluate AI and computational models. A skills assessment could be carried out to identify gaps, which could subsequently be addressed through appropriate workforce planning, training and secondments. Identifying and overcoming skills gaps will be a continual requirement in this field as technologies progress and should be done in collaboration with relevant organisations such as the Centres of Excellence for Regulatory Science and Innovation (CERSIs).

36. Following last year's creation of the UK National Commission on the Regulation of AI in Healthcare, we look forward to the publication of the new regulatory handbook on AI in healthcare. It could be valuable to see the handbook to incorporate the above principles.

2. Data use and governance

[12] OECD (2024). *Recommendation of the Council on Artificial Intelligence.*

37. Access to and linkage of high-quality, representative datasets are vital for training and developing AI models and building synthetic data. The UK's rich data assets offer significant potential for AI development and use, but this is undermined by siloed datasets and infrastructural, legal, and governance barriers. To address this, regulators could take a more active role in ensuring better access to high-quality data through demand signalling. They could use their influence to make the case for better access to data and ensure data sharing is framed positively, highlighting the potential for the development of safer and more efficacious medicines. The Yellow Card Biobank was highlighted as a positive example of how regulatory leadership can help unlock data assets.

38. The responsible and transparent use of data is crucial to building public trust in AI technologies. Trial participants must be provided with clear information about how their data will be used during and after the trial so that they can provide informed consent.

39. Inclusion and exclusion criteria can introduce systemic bias, affecting model performance and limiting applicability across diverse populations. To address this, regulators must develop clear frameworks to certify data quality and ensure that AI tools are trained on representative, clinically meaningful datasets.

40. In light of the roundtable discussions, Professor Andrew Morris, President of the Academy of Medical Sciences and Director of Health Data Research UK, drew on his expertise to suggest that regulators, in partnership with industry and academia, could lead a whole-system surveillance of the safety, effectiveness and value of medicines and devices. This could involve establishing a UK platform of routinely collected data linked to health outcomes, similar to the Data Analysis and Real World Interrogation Network (DARWIN EU). This platform could harness the UK's rich data assets while overcoming existing challenges such as siloed datasets and infrastructural, legal and governance barriers.[13]

b) Is there a concern that innovative start-ups, SMEs and industrial partners in this space will move efforts overseas owing to failures in NHS procurement, support for scale-up, sluggish regulation, or other factors? If so, what could be done to address this?

No answer provided

c) Is the UK at risk of losing leading clinical academics, researchers, and innovators working on personalised medicine and AI to other countries? What can be done to ensure the UK retains and attracts the talent needed to remain competitive in this field?

Academy answer

[13] Academy of Medical Sciences and Regulatory Innovation Office (2025). *Regulating AI and computational models in clinical trials.*

41. The clinical academic workforce, who work across universities and the NHS to conduct health research, is in decline, with data from MSC showing a fall in the number of consultants as a proportion of the NHS workforce, from 4.3% in 2011 to 3.4% in 2024.[14] This is coupled with an ageing population, with 35% of clinical academics being over the age of 55.[15] These declines are further pronounced in primary care and other medical professions, including nurses, midwives, and allied health professionals.[16] There has also been a decline of 13% in the already small number of clinical academics working in paediatrics and child health (positions at Professor, Reader/Senior Lecturer and Lecturer levels), currently at 210, compared to 241 in 2004.[17]

42. The decline is being driven by systemic barriers, notably the lack of time allocated for research standing out as a major disincentive. To sustain a robust research pipeline and drive health improvements, it is essential to invest in the next generation of clinical academics and implement coordinated system-wide solutions.[18] This was highlighted in DSIT's UK Research and Innovation Workforce Survey, with responses "calling for more funding for clinical academics, specifically in the NHS" and "support and funding for career training as well as better alignment of government policy with R&D and R&I goals".[19]

43. The UK spends less on R&D than competitor nations. This means the UK risks losing a historic competitive advantage and decreasing attractiveness for investment and talent. Secure, long-term public funding commitments for R&D would provide the certainty to private investors on national research priorities to. Additionally, the sustainability of our universities is precarious, as they continue to show a substantial deficit.[20]

44. The Academy has launched a new, cross-sector UK Medical Science Careers Taskforce to identify and address gaps across clinical and non-clinical career pathways. The taskforce will produce a national 'gaps and fixes' career pathways map, with particular attention given to the boundaries between clinical and non-clinical roles, the barriers to cross-sector movement between the NHS, academia and industry, and the skills needed to engage with AI and data-driven technologies.[21]

Section 2: Innovation in the NHS: deployment

Deployment in practice

5. Translating cutting-edge medical science into routine NHS treatment has long been recognised as a problem. Considering personalised medicine and AI as an example, what are the key systemic barriers, such as

[14] Medical Schools Council (n.d). *Staffing levels of medical clinical medical academics.*
[15] *Ibid.*
[16] Association of UK University Hospitals (2016). *Transforming healthcare through clinical academic roles in nursing, midwifery and allied health professionals.*
[17] Academy of Medical Sciences (2024). *Prioritising early childhood to promote the nation's health, wellbeing and prosperity.*
[18] Medical Research Council (2025). *Clinical researchers in the UK: reversing the decline.*
[19] Department for Science, Innovation and Technology (2025). *Insights from the UK-wide survey of the Research and Innovation Workforce 2024.*
[20] Academy of Medical Sciences (2024). *Response to Invest 2035: the UK's modern industrial strategy.*
[21] Academy of Medical Sciences (2026). *New national taskforce to secure the future of UK medical science careers.*

procurement processes, workforce, or IT infrastructure, that prevent or delay the deployment of proven innovations across the NHS? Which of these barriers are the most important in practice?

Academy answer

45. It is generally agreed that the NHS is currently not well equipped to act as a recipient and purchaser of new and innovative technologies.

46. This is due to structural and cultural reasons, including the organisation of the NHS procurement system, an embedded historical culture of risk aversion, and time and resource pressures, which makes it difficult for NHS staff to embrace new and innovative therapies and technologies. In relation to the examples given in the question:

1. Culture

47. We have heard that in NHS procurement, 'equality trumps innovation' and unless a service is able to deliver a new technique to all parts of the country it is blocked. There is also often a very high barrier of evidence required before adoption. For example, we heard from one Fellow that despite level 1 evidence from the UK and other countries of the benefit and cost effectiveness of supplemental imaging in breast screening, another review of supplemental imaging and cost effectiveness has been suggested. Such cases could be stifling adoption of novel techniques.

2. Procurement Processes

48. Our Fellows have identified that UK Government procurement is notoriously difficult to navigate, often causing biotech and start-ups to set up operations outside of the UK. Some Fellows have stressed the need to have a centralised system for NHS innovation procurement, so that digital health solutions do not need to negotiate with each hospital trust separately – a 'single front door' for the roll out of innovations for Integrated Care Boards and/or Health Innovation Networks.
49. Documentation required for the deployment of AI is lengthy and burdensome. The responsibility lies with each Trust for safe deployment of AI and protection of patient data. So again, the approval process could be centralised in a similar way to trials undertaken in the NHS which are approved by the Human Research Authority. This reduces the burden on each Trust and speeds up local Trust approvals

50. We have heard that the UK should consider the use of the Government (or Government agencies) as a 'first customer' for innovations, particularly with consideration of innovation in public sector procurement. This alignment model is already used in countries such as the United States to drive investment in growth and innovation.[22] Clinical safety documentation could also be centralised.

3. Workforce

[22] Academy of Medical Sciences (2024). *Response to Invest 2035: the UK's modern industrial strategy*.

51. There is a reported disconnect between the NHS/clinicians and tech developers, and systems for implementation are slow. This disconnect is exacerbated by the lack of 'joined-up' health datasets and fragmented application systems for data access which limits research into AI-based health technologies. Information Governance teams could also be unskilled to deal with AI requests.

4. IT Infrastructure

52. IT is a significant barrier and is costly to adapt for new ways of working. Investment in IT is very costly and complicated. But this is one of the biggest barriers to streamline working practices.

53. NHS Trusts are struggling with digital innovation and do not have the capacity to implement changes required, including post-market monitoring and surveillance tools. There are now local IT committees to prioritise which work should be done first. This can introduce months of delays. An example is the AIDF programme where AI deployment has been delayed by more than 2 years despite additional resource being given.

a) Why have previous attempts to address this not succeeded? What would be effective in addressing these problems?

No answer provided

b) What are examples of good practice within the NHS of adopting these innovations that should be learned from and could be deployed more widely? What would need to happen to make that a reality?

No answer provided

c) To what extent are issues in adopting innovation in the NHS down to an overstretched workforce, particularly of clinical academics, and what needs to be done to address this?

Academy answer

54. Clinical delivery pressures and a failure to value the contribution that research makes are creating a healthcare system that is unable to prioritise research. A major barrier is the limited time and opportunities for people who drive research and innovation in healthcare settings. Clinical academics and other researchers are not supported adequately to drive innovations.[23]

55. Emerging technologies such as AI research often require a collaborative, multidisciplinary team approach that current training provisions do not address. Training programmes should be strengthened to provide researchers, developers and clinicians with the multidisciplinary networks and skills needed to develop and use new AI technologies in the NHS. Emphasis should also be placed on ethics

[23] Academy of Medical Sciences (2024). *Response to NHS 10-Year Health Plan.*

training for everyone involved to ensure that they are operating with high levels of research integrity.[24]

d) Considering the patient perspective, what needs to be done in order to encourage uptake of personalised medicine in the NHS and provide a service that puts patient needs first?

Academy answer

See response to Q4d.

Regulating AI and personalised medicine

6. How should the NHS and relevant regulators, including the Medicines and Healthcare products Regulatory Agency (MHRA) and the National Institute for Health and Care Excellence (NICE), as well as professional and clinical bodies, balance the need to evaluate new personalised and AI-driven treatments with making innovative treatments available to patients? To what extent is the regulatory framework around personalised medicine and AI appropriate and proportionate, and where could it be improved?

Academy answer

See response to Q4.a, in relation to clinical trial regulation.

a) Does the MHRA, under new leadership, have sufficient regulatory capacity to assess the newest developments in personalised medicine and AI? What can we learn from regulatory regimes in other countries?

No answer provided

b) Is the MHRA's framework for software and AI as a medical device appropriate and keeping up-to-date with the latest developments?

No answer provided

The health economics of personalised medicine and AI

7. One major barrier to personalised medicine is that it can be expensive and it may vary in effectiveness depending on individuals. This means it may not fit within NICE cost-effectiveness models and the NHS's desire to standardise the care people receive. Are current appraisal frameworks and commissioning models for the NHS appropriate for personalised medicine? What are the health economics implications of personalised medicine?

Academy answer

[24] Academy of Medical Sciences (2019). *Artificial Intelligence and Health*.

56. As the wide-scale adoption of AI-based health technologies requires significant funding, in addition to evaluation of effectiveness, we have heard that a standardised and transparent process to calculate real-world benefit (in terms of health economics as well as improved health outcomes) is required to inform commissioning decisions.

57. AI can have system-wide effects – for example, the benefits to a specialist clinic and their patients of a new diagnostic aid introduced in general practice that reduces the number of referrals to the specialist clinic, in terms of reclaimed resource and staff time. It would be useful to ensure that regulatory or health technology assessment systems capture these downstream benefits, using broader and more complex economic modelling that considers downstream effects on the system in addition to Quality-Adjusted Life Years. This might encourage a focus on point solutions rather than technologies that can transform and improve whole care pathways or systems.

58. Communication to commissioners, and local and central government, of the systemic value proposition and return on investment once an AI-based health technology is adopted will be important, to ensure that support for the technology is sustained. Healthcare bodies would need support to measure impact and develop or implement metrics.

59. Nationally agreed, standardised formats for assessments by healthcare bodies of the impacts of AI-based health technologies and other governance tools could be helpful to see in upcoming regulatory guidance. [25]

a) What prospects are there for reducing the costs of personalised medicines as they are deployed more widely across the NHS? How effectively can we forecast how the cost of treatments might evolve? Is there fragmentation in the way that personalised treatments can be commissioned and funded in the NHS which create barriers to adoption?

Academy answer

60. In cost calculations, it is important to take a broad approach to capturing the value that AI can bring, whether in monetary form back to the NHS, in equity or royalty streams, or in getting a technology to the NHS. In the UK, we need to build up a series of use cases with the public to demonstrate how the trustworthy use of data has untapped potential for creating value for public and patient outcomes, for the NHS, and for the economy. Frameworks for evaluating the utility of treatments in a more holistic and nuanced way, such as the EQ-5D-5L value set employed by NICE, may also be important for capturing the full value of personalised medicine.[26]

The Government's strategic approach to innovation in the NHS

[25] Academy of Medical Sciences and Royal Academy of Engineering (2023). *Accelerating effective and safe adoption of artificial intelligence in the healthcare system*.
[26] National Institute for Health and Care Excellence (2026). *Better data for better decisions*.

8. What should the Government do, at a strategic level, to strengthen the feedback loop between medical research, the life sciences industry, and the NHS, so that innovations developed domestically can be adopted at scale in the NHS, and clinical insights from the NHS can feed back into R&D and the life sciences sector? What would be the most important interventions you would prioritise to improve this process? What does the NHS most urgently need to do to position itself to benefit from innovations in personalised medicine and AI?

Academy answer

61. Innovation happens at the intersection of sectors, and the UK benefits from a vibrant and diverse life sciences sector. However, limited understanding between sectors, poorly aligned incentives, and a perception of both personal and institutional risk from cross-sector mobility can weaken the feedback loop between the health research sector, the life sciences industry, and the NHS.

62. This is particularly a problem for clinical academics, who work between NHS and academia, as discussed elsewhere in this response.

63. Government should:

- Work across departments to invest in training and maintaining a world-class research workforce, through investment in career sustainability, including the ability of the workforce to move across sectors, disciplines and borders.
- Encourage secondments and joint appointments between academia, industry, NHS, Government departments and agencies. An effective, resilient, supported and diverse research workforce is also central to the life sciences industry.

64. However, research culture and career structures can be inflexible, precarious and exclusive. Fellows reflected that research culture is not consistently supportive of team science and interdisciplinary research. Government should continue work to deliver the R&D People and Culture strategy, raising the profile of this work externally to show Government's commitment to supporting a diverse research workforce.[27]

65. The Academy is commissioning work to better capture and articulate the value and impact of cross-sector mobility in advancing the uptake and adoption of innovations in health systems, and of the benefits for patients, innovations, and economic growth. Conversely, we will explore the risks, including to the NHS, of inadequate or unidirectional movement out of sectors.

a) Does the Government have the right structures in place to govern and oversee innovation in the NHS? Is it clear who has ownership of pushing research, innovation, and new technologies within the NHS? How effective are the links between projects like Genomics England, NIHR/MRC research,

[27] Academy of Medical Sciences (2023). *Future-proofing UK Health Research: a people-centred, coordinated approach.*

the Cell and Gene Therapy catapult, and NHS patient care? Are the Government's target-driven strategies, like the National Cancer Plan, effective at driving innovation?

No answer provided

b) **To what extent is fragmentation across trusts, integrated care boards, and national bodies, contributing to uneven or slow adoption of innovation? Are there any reforms that could realistically address this?**

No answer provided

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