



DEBATE PACK

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General debate on the involvement of patients in the use of artificial intelligence in healthcare

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Summary

At 1.30pm on 5 September 2019 there will be a Westminster Hall debate on the involvement of patients in the use of artificial intelligence in healthcare. This debate was nominated by the Backbench Business Committee and will be led by Henry Smith MP.

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The House of Commons Library prepares a briefing in hard copy and/or online for most non-legislative debates in the Chamber and Westminster Hall other than half-hour debates. Debate Packs are produced quickly after the announcement of parliamentary business. They are intended to provide a summary or overview of the issue being debated and identify relevant briefings and useful documents, including press and parliamentary material. More detailed briefing can be prepared for Members on request to the Library.

1. What is AI, and how can it be used in healthcare?

The Academic Health Sciences Network (AHSN) report, [Accelerating Artificial Intelligence in health and care: results from a state of the nation survey \(2018\)](#), defines Artificial Intelligence (AI) as a series of advanced technologies that enable machines to effectively carry out complex tasks that would require intelligence if completed by a human. The report set out at what stage the development of AI had reached in healthcare in England. It surveyed people in the sector currently using or developing AI, and highlighted three key areas where it was being used in healthcare:

- Unlocking value in data/ analytics (75% of responses submitted for the survey)
- Diagnostics and condition recognition (60%)
- Organisational processes (50%)

The survey also asked respondents to identify the areas with the strongest case for early use of AI in healthcare, and it was seen as particularly important for:

- Health promotion and preventative health
- Development in drug discovery and medical research

The report also highlighted that one of the top enablers of AI is a “grounding the use of AI in real problems as expressed by citizens, carers and other health professionals.”¹

Professor Eric Topol was commissioned by the Department of Health and Social Care (DHSC) to carry out a review of the education and training changes that may be needed to maximise the opportunities of technology, AI and genomics in the NHS. His report was published in February 2019 and set out some of the potential of AI (and robotics) technologies in healthcare

Healthcare is data intensive, combining not only huge volumes of disparate and complex sources of data, but also complex classifications and meanings. Advances in mathematics, computing power, cloud computing and algorithm design have accelerated the development of methods that can be used to analyse, interpret and make predictions using these data sources.

AI encompasses a multitude of technologies, including but not limited to analysing and discovering patterns in data. AI has the potential to transform the delivery of healthcare in the NHS, from streamlining workflow processes to improving the accuracy of diagnosis and personalising treatment, as well as helping staff work more efficiently and effectively. With modern AI, a mix of human and artificial intelligences can be deployed across discipline boundaries to generate a greater collective intelligence.²

¹ Academic Health Sciences Network (AHSN), [Accelerating Artificial Intelligence in health and care: results from a state of the nation survey](#), Autumn 2018, p39

² [Preparing the healthcare workforce to deliver the digital future](#) (Topol Review), February 2019, p54

The Topol report also recommended that patients should be involved from the beginning in the design and implementation of AI software for healthcare, ensuring that their needs and preferences are reflected in the co-design process.³

The Government has set out a number of examples where AI technology is already being used across the NHS. These include their use to earlier diagnose heart disease and lung cancer, to reduce the number of unnecessary operations performed due to false positives, assist research by better matching patients to clinical trials, and support the planning of care for patients with complex needs. Examples include:

- Moorfields/Deepmind – 1 million anonymised eye scans were shared with Deepmind under a research agreement that began in mid-2016. Deepmind’s algorithm is designed to find early signs of age-related macular degeneration and diabetic retinopathy.
- John Radcliffe Hospital – worked with their partner, Ultromics, to use AI to improve detection of heart disease and lung cancer
- Imperial College London – developed a new AI system that can predict the survival rates for patients with ovarian cancer⁴

Chapter 5 of the [NHS Long Term Plan](#) (January 2019) covers how upgrades to technology will be used to enable digital access to NHS services, and improve clinical care and population health. This noted that one of the practical priorities that will drive NHS digital transformation will be the use of “decision support and artificial intelligence (AI) to help clinicians in applying best practice, eliminate unwarranted variation across the whole pathway of care, and support patients in managing their health and condition.”⁵

The UK Government’s [Life Sciences Sector Deal 2](#) (December 2018) notes that the Medicines and Healthcare products Regulatory Agency (MHRA) is developing a regulatory framework for medical devices that is able to keep pace with technological developments, such as AI. In particular, the MHRA is working with NHS Digital to develop a pilot in order to test and validate algorithms and other AI used in medical devices.⁶

Health services are a devolved area so the information in this briefing focusses on developments within the NHS in England. Some information on the development of life sciences research, in collaboration with the NHS, in other parts of the UK can be found in the [Life Sciences Sector Deal 2](#) (for example, a new Industrial Centre for AI Research in Digital Diagnostics (iCAIRD) in Glasgow, announced in November 2018).⁷

³ *Ibid.* see section 6.3

⁴ See Gov.uk, [New code of conduct for artificial intelligence \(AI\) systems used by the NHS](#), February 2019

⁵ [NHS Long Term Plan](#), 7 January 2019, chapter 5

⁶ UK Government, [Life Sciences Sector Deal 2](#), December 2018, p42

⁷ *Ibid.* p57

2. Recent policy developments

In October 2018 the Department of Health and Social Care produced a policy paper, [The future of healthcare: our vision for digital, data and technology in health and care](#). This paper sets out a number of plans intended to modernise NHS digital services. Alongside this vision document, NHS Digital published a new draft [NHS digital, data and technology standards framework](#) setting out early thinking and expectations for the use of data, interoperability, design and IT commercial standards within the NHS.

On 19 February 2019, the Department of Health and Social Care published a [New code of conduct for artificial intelligence \(AI\) systems used by the NHS](#), setting out the behaviours expected from those developing AI and related technologies. Also on 19 February 2019 the Department of Health and Social Care announced that a new unit named [NHSX would be set up](#) to help ensure that the NHS modernises in terms of digital systems and technology.

On 12 June 2019, Health Minister Baroness Blackwood gave a speech about how AI and technology could be harnessed to improve patient outcomes.⁸ On 15 July 2019 the Department published [guidance Creating the right framework to realise the benefits for patients and the NHS where data underpins innovation](#). Announcing the publication of this guidance, the Government stated that a new Centre of Expertise will offer support to those NHS organisations seeking to understand whether proposed data arrangements meet the requirements set out in five guiding principles. The Centre of Expertise will sit in NHSX.

On 8 August 2019 the Government announced £250 million of investment to help establish a national AI laboratory, which would also sit within NHSX.⁹

A response to a Lords Parliamentary Question in June 2019 also sets out some further recent developments:

...The Office for Artificial Intelligence and UK Research and Innovation have announced centres for doctoral training in AI-enabled healthcare across the UK.

The Office for Life Sciences has established five Centres of Excellence in digital pathology and radiology with AI, supported by an initial £50 million Industrial Strategy Challenge Fund investment and a further £50 million of scale up funding from the Department of Health and Social Care. The centres are working with NHS and industry partners, including innovative small and medium-sized enterprises, to develop pioneering AI-enabled pathology and radiology tools.

⁸ [Embracing AI and technology to improve patient outcomes](#), speech by Baroness Blackwood at CogX, the festival of artificial intelligence (AI) and emerging technology, 12 June 2019

⁹ Gov.uk, [Health Secretary announces £250 million investment in Artificial Intelligence](#), August 2019. See also BBC News, [NHS to set up national artificial intelligence lab](#); and [King's Fund comments on the government announcement of funding for NHS technology](#), August 2019

In addition we are also working closely with Health Education England as they follow through on the recommendations made by the Topol Review *Preparing the healthcare workforce to deliver the digital future*.

In March 2019, the National Institute for Health and Care Excellence published its *Evidence Standards Framework for Digital Health Technologies*, outlining the evidence required by businesses to demonstrate the effectiveness and economic impact of digital health technologies.

Taken together these steps, and others, will ensure there is a clear framework for the development and use of AI in the healthcare sector including the skills, a clear path to market, and a rigorous process for ensuring the safety, efficacy and ethics of the tools developed, deployed and used.¹⁰

The Government provided the following response to a PQ from Henry Smith MP about what steps NHSX will take to ensure that patients are (a) informed about and (b) engaged in the use of AI in healthcare.

NHSX is driven by user needs, so any technology we introduce, including that related to artificial intelligence (AI), must be done with, and not for patients. We are developing a policy toolkit for responsibly applied AI in health and care, and we are working closely with public voice organisations to ensure that patients are involved and engaged.

We are also developing tools to help technology vendors comply with principle 7 of the Code of Conduct for Data-Driven Health and Care Technology: "Show what type of algorithm is being developed or deployed, the ethical examination of how the data is used, how its performance will be validated and how it will be integrated into health and care provision." In the middle of April these tools were tested with patients and we are currently refining based on the feedback we received.

We will continue to engage with patients as we work to maintain and improve public trust and patient safety.¹¹

¹⁰ HL15939 [[Health Services: Artificial Intelligence](#)] 6 June 2019

¹¹ PQ 246998 [[Health Services: Artificial Intelligence](#)] 2 May 2019

3. Further reading

There have been a number of recent reports on the potential benefits, and possible negative consequences, of the increasing use of Artificial Intelligence (AI) in healthcare. The following list is not comprehensive but highlights reports, blogs and other material looking at specific areas where AI could help the NHS become more efficient and deliver better outcomes for patients. Some of these reports also highlight barriers to the implementation of this technology, and areas where there are concerns about safety, privacy or wider ethical issues. Some reports have focussed on the importance of engaging patients and the public in the development of AI, including the report by the All-Party Parliamentary Group on Heart and Circulatory Diseases entitled “Putting patients at the heart of artificial intelligence”:

- Future Advocacy, [Artificial intelligence and the NHS: What could it look like?](#) (8 August 2019)
- All-Party Parliamentary Group on Heart and Circulatory Diseases, [Putting patients at the heart of artificial intelligence](#) (April 2019) called
- Academy of Medical Royal Colleges, [Artificial Intelligence in healthcare](#) (January 2019)
- Academic Health Science Network Network, [Accelerating Artificial Intelligence in health and care: results from a state of the nation survey](#) (Autumn 2018)
- Nuffield Council on Bioethics, [Artificial Intelligence \(AI\) in healthcare and research](#) (May 2018)
- Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA), [Artificial Intelligence: Real Public Engagement](#) (May 2018)
- Future Advocacy and the Wellcome Trust, [Ethical, social, and political challenges of artificial intelligence in health and care](#) (April 2018)
- [House of Lords Select Committee on Artificial Intelligence](#) (April 2018) (see also the [Government response](#) to the Committee’s report, June 2018)
- Imperial College London, [How AI can transform healthcare and solve clinical problems](#) (March 2018)
- The King’s Fund, [Collaboration between DeepMind and Taunton and Somerset NHS Foundation Trust](#) (February 2018)
- Reform, [Thinking on its own: AI in the NHS](#) (January 2018)

- Commons Library, [Artificial Intelligence and Automation in the UK](#) (CBP 8152, December 2017)

4. News

[Trusts turn to artificial intelligence to tackle staff shortage](#), Health Service Journal, 20 August 2019

[NHS to set up national artificial intelligence lab](#), BBC News online, 8 August 2019

[Google AI lead: Machine learning 18 months away from NHS hospitals](#), Health Service Journal, 31 July 2019

[DeepMind AI could save thousands of NHS kidney patients' lives](#), Telegraph, 31 July 2019

[To create a sustainable NHS we must urgently invest in cutting-edge technology](#), The Conversation, 31 July 2019

[Data is our NHS' most precious asset – the next Prime Minister must protect it](#), City A.M., 23 July 2019

['Anonymised' data can never be totally anonymous, says study](#), Guardian, 23 July 2019

[NHS teams up with Amazon to bring Alexa to patients](#), Guardian, 10 July 2019

[Cardiologist Eric Topol: 'AI can restore the care in healthcare'](#), Observer, 7 July 2019

[Scientists claim to have developed world's first vaccine with artificial intelligence](#), Telegraph, 3 July 2019

[How technology is helping the NHS get an upgrade](#), Telegraph, 1 July 2019

[How smart tech is helping people with dementia](#), Financial Times, 25 June 2019

[AI brings opportunity and risk to the health sector](#), Financial Times, 21 June 2019

[NHS data is worth billions – but who should have access to it?](#),
Guardian, 10 June 2019

5. Parliamentary Material

5.1 Oral Questions

[NHS: Automation](#), HC, 798 c5, 15 July 2019

Asked by: Viscount Ridley (Con) | **Party:** Conservative Party

My Lords, does my noble friend agree with one of the key points made by Professor Topol that one of the benefits of artificial intelligence is the “gift of time”, as he has put it? In

other words, patients can spend more time with their doctor if certain more routine things are automated. Will my noble friend make sure that that is one of the key aims of bringing automation into healthcare?

Answered by: Baroness Blackwood of North Oxford | **Party:** Conservative Party

My noble friend is right. One of the key recommendations is that by automating routine analyses such as radiology, diagnoses and pathology and routinely bringing in AI to sequence bed management, we will reduce the burden on clinicians so that they are able to see more patients. The review makes specific recommendations to help the workforce become more digital ready, which means increasing capacity and capability, and building the right environment. That is exactly what we have embedded into the NHS people plan and all that we are working on through NHSX.

[Engagements](#), HC, 650 c879, 5 December 2018

Asked by: Mr Dunne | **Party:** Conservative Party

(...)

Does my right hon. Friend believe that today’s announcement of significant investment by the UK life sciences sector to work alongside the NHS, using genomics and artificial intelligence to help diagnose major diseases early, shows that world-class life sciences companies, such as Agilent in my constituency, will continue to invest in the UK to help the NHS improve patient outcomes post-Brexit?

Answered by: The Prime Minister | **Party:** Conservative Party | **Department:** Prime Minister

That investment of £1 billion is indeed significant. It will deliver a state-of-the-art research and development facility in the UK and support 650 jobs. It is absolutely right to say that that shows the opportunities available to the UK post-Brexit. It also shows the advantage of our industrial strategy, with AI right at the heart of it, recognising the importance of AI in the health sector in the future. This is a very significant investment. It will support jobs and other employment in the UK, and it will support our economy in the future.

[Artificial Intelligence](#), HC, 645 c864, 24 July 2018

Asked by: Mr Dunne | **Party:** Conservative Party

I also welcome my right hon. Friend to his new role. He will bring tremendous energy and enthusiasm, particularly into the information advantage that we know is needed to transform the NHS. Does he share my view that not only will this transform patient outcomes but we can use artificial intelligence to improve patient treatments? What are his initial views of the obstacles standing in the way of rapid uptake of such technologies?

Answered by: Matt Hancock | **Party:** Conservative Party |
Department: Health and Social Care

There are huge opportunities for AI to improve patient outcomes and to make life easier for staff. In answer to the second part of my hon. Friend's question, it is all about getting interoperable data rules and standards in place so that different systems can talk to each other in a secure, safe and innovative way.

[NHS: Equitable Access](#), HL, 792 cc633-6, 5 July 2018

Asked by: Baroness Thornton | **Party:** Labour Party

To ask Her Majesty's Government what steps they will take to ensure that National Health Service patients have equitable access to the benefits of (1) artificial intelligence, (2) genomic medicine, (3) new drugs, and (4) innovative treatments.

Answered by: The Parliamentary Under-Secretary of State, Department of Health and Social Care (Lord O'Shaughnessy) (Con) | **Party:** Conservative Party

My Lords, the NHS was founded on the principle of universal access and we are committed to making sure that that remains. To achieve this we are establishing a genomic medicine service to provide equitable access to testing across the NHS. We have commissioned the Topol review so that our staff can maximise patient benefits from technological advances and we are accelerating access to innovation across the country by expanding the role of academic health science networks.

5.2 Written Questions

[NHS: Amazon](#), HC, PQ 275752, 15 July 2019

Asked by: Ashworth, Jonathan | **Party:** Labour Party ·
Cooperative Party

To ask the Secretary of State for Health and Social Care, with reference to the announcement that NHS health information will be available through Amazon's Alexa, what assessment his Department has made of the effectiveness of Alexa for identifying health information; what safeguards for patient safety are in place to monitor the effectiveness of Alexa; whether the information provided by Alexa that originates from NHS-verified health information be clearly differentiated from information that originates from other non-verified sources; and if he will make a statement.

Answering member: Jackie Doyle-Price | **Party:** Conservative Party | **Department:** Department of Health and Social Care

The information provided by Amazon Alexa in response to questions asked by users is taken directly from the National Health

Service website. It is an alternative mechanism for accessing professional NHS-verified health information that is already freely available on the NHS website.

The service provided by Amazon will not provide any form of diagnosis or advice. It is intended to provide NHS-verified information on the symptoms and treatments for different medical conditions using the exact wording from the NHS website.

When a response is given by Alexa to a question from a user, it will be preceded with the phrase, "according to the NHS website...", which clearly differentiates it from any other source of information.

NHS Digital is working closely with Amazon to assess the effectiveness of the service. The algorithm used by Amazon is still learning and will be updated continuously to learn how people are asking questions about health conditions.

[Health Services: Artificial Intelligence](#), HL15939, 6 June 2019

Asked by: Lord Taylor of Warwick | **Party:** Non-affiliated

To ask Her Majesty's Government what steps they are taking to invest in the development and use of artificial intelligence in the UK healthcare sector.

Answering member: Baroness Blackwood of North Oxford | **Party:** Conservative Party | **Department:** Department of Health and Social Care

The Department of Health and Social Care is leading on the Prime Minister's Mission to "Use data, Artificial Intelligence and innovation to transform the prevention, early diagnosis and treatment of chronic diseases by 2030." We hope that as we work towards this overall goal, we can ensure that: patients experience better care, clinicians deliver better care, commissioners are better able to commission data-driven technologies and the United Kingdom is a great place to do business in artificial intelligence (AI) for health and care.

We are working in partnership with organisations across the National Health Service, the Department for Business, Energy and Industrial Strategy, Office for Life Sciences, Office for Artificial Intelligence and Better Regulation Executive to engage with businesses in the sector so that we benefit from the potential for AI to improve care, deliver better outcomes, contribute to efficiency in the health and care system and contribute to the wider economy. In September 2018, we published the Code of Conduct for Data-Driven Health and Care Technology, which clearly sets out the behaviours we expect from those developing AI and related technologies. The Code was updated in February 2019 based on feedback, including from industry partners, and we are working with them to develop case studies showing good practice in complying with the Code. We are also developing tools to help businesses comply with the Code of Conduct.

The Office for Artificial Intelligence and UK Research and Innovation have announced centres for doctoral training in AI-enabled healthcare across the UK.

The Office for Life Sciences has established five Centres of Excellence in digital pathology and radiology with AI, supported

by an initial £50 million Industrial Strategy Challenge Fund investment and a further £50 million of scale up funding from the Department of Health and Social Care. The centres are working with NHS and industry partners, including innovative small and medium-sized enterprises, to develop pioneering AI-enabled pathology and radiology tools.

In addition we are also working closely with Health Education England as they follow through on the recommendations made by the Topol Review *Preparing the healthcare workforce to deliver the digital future*.

In March 2019, the National Institute for Health and Care Excellence published its *Evidence Standards Framework for Digital Health Technologies*, outlining the evidence required by businesses to demonstrate the effectiveness and economic impact of digital health technologies.

Taken together these steps, and others, will ensure there is a clear framework for the development and use of AI in the healthcare sector including the skills, a clear path to market, and a rigorous process for ensuring the safety, efficacy and ethics of the tools developed, deployed and used.

[Health Services: Artificial Intelligence](#), HC, PQ 251190, 13 May 2019

Asked by: Soames, Sir Nicholas | **Party:** Conservative Party

To ask the Secretary of State for Health and Social Care, what guidance his Department has issued to businesses in the healthcare sector on preparing their workforce for the effect of the introduction of Artificial Intelligence.

Answering member: Jackie Doyle-Price | **Party:** Conservative Party | **Department:** Department of Health and Social Care

The Department is leading on the Prime Minister's Mission to 'Use data, Artificial Intelligence and innovation to transform the prevention, early diagnosis and treatment of chronic diseases by 2030.' We hope that as we work towards this overall goal, we can ensure that patients experience better care, clinicians deliver better care, commissioners are better able to commission data-driven technologies and the United Kingdom is a great place to do business in artificial intelligence for health and care.

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We are also working closely with Health Education England as they follow through on the recommendations made by the Topol Review 'Preparing the healthcare workforce to deliver the digital future.'

In March 2019, the National Institute for Health and Care Excellence published its Evidence Standards Framework for Digital Health Technologies, outlining the evidence required by businesses to demonstrate the effectiveness and economic impact of digital health technologies.

[Health Services: Artificial Intelligence](#), HC, PQ 246998, 2 May 2019

Asked by: Smith, Henry | **Party:** Conservative Party

To ask the Secretary of State for Health and Social Care, what steps NHSX will take to ensure that patients are (a) informed about and (b) engaged in the use of artificial intelligence in healthcare.

Answering member: Jackie Doyle-Price | **Party:** Conservative Party | **Department:** Department of Health and Social Care

NHSX is driven by user needs, so any technology we introduce, including that related to artificial intelligence (AI), must be done with, and not for patients. We are developing a policy toolkit for responsibly applied AI in health and care, and we are working closely with public voice organisations to ensure that patients are involved and engaged.

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We will continue to engage with patients as we work to maintain and improve public trust and patient safety.

[Health Services: Artificial Intelligence](#), HC, PQ 246997, 2 May 2019

Asked by: Smith, Henry | **Party:** Conservative Party

To ask the Secretary of State for Health and Social Care, if he will take steps to implement the recommendations in the report by the all-party parliamentary group on Heart and Circulatory Diseases entitled Putting patients at the heart of artificial intelligence.

Answering member: Jackie Doyle-Price | **Party:** Conservative Party | **Department:** Department of Health and Social Care

There is a cross-cutting programme of work across the health and care system, led by NHSX, which delivers on the All Party Parliamentary Group recommendations and ensure that only the best and safest Artificial Intelligence systems are used by the National Health Service. The programme will also make it easier for suppliers to develop technologies that tackle some of the biggest issues in healthcare. Officials from the Department were

part of the advisory board for the report and supported the development of the recommendations.

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