£36 million boost for AI technologies to revolutionise NHS care

- New technology will help detect cancers and provide mental health support
- Projects are part of the NHS AI Lab's £140 million AI in Health and Care Award

Thousands of patients and NHS staff will benefit from dozens of new pioneering projects awarded a share of £36 million to test state-of-the-art AI technology. The projects will help the NHS to transform the quality of care and the speed of diagnoses for conditions such as lung cancer.

At CogX Festival today (16 June), the Health and Social Care Secretary Matt Hancock announced the winners of the second wave of the NHS AI Lab's AI in Health and Care Award. The 38 trailblazing projects backed by NHSX and Accelerated Access Collaborative (AAC) include:

- an AI-guided tool to help doctors and nurses to diagnose heart attacks more accurately
- an algorithm to fast-track the detection of lung cancer
- an AI-powered mental health app to help tackle symptoms of anxiety and depression while also identifying people experiencing severe mental health difficulties
- tech to help spot undiagnosed spinal fractures

Already over 17,000 stroke patients and over 25,000 patients with diabetes or high blood pressure have benefited from the first round of the AI in Health and Care Award since September, where £50 million was given to 42 AI technologies.

Health and Social Care Secretary, Matt Hancock said:

> AI has the potential to completely revolutionise every part of how we approach healthcare, from how we diagnose diseases and the speed at which our doctors and nurses deliver treatments to how we support people's mental health.
>
> The 38 projects we are backing reflect the UK's trailblazing approach to innovation in the healthcare sector, and could help us take a leap forward in the quality of care and the speed of disease diagnoses and treatment in the NHS.
>
> Confronted with this global pandemic, our tech sector has risen to the challenge and upended how we do things through innovations to support people to test from home, complete remote consultations and diagnose issues safely.

Sir Simon Stevens, chief executive of NHS England, said:

> Through our NHS AI Lab we're now backing a new generation of ground-breaking but practical solutions to some of the biggest challenges in healthcare. Precision cancer diagnosis, accurate surgery, and new ways of offering mental health support are just a few of the promising real world patient benefits. Because as the NHS comes through the pandemic, rather than a return to old ways, we're supercharging a more innovative future.
>
> So today our message to developers worldwide is clear – the NHS is ready to help you test your innovations and ensure our patients are among the first in the world to benefit from new AI technologies.

The AI in Health and Care Award aims to accelerate the testing and evaluation of AI in the NHS so patients can benefit from faster and more personalised diagnosis and greater efficiency in screening services.

For example, use of Paige Prostate will be able to give more information about prostate cancer, including detecting a tumour, its size and how severe it is, enabling clinicians to make treatment more specific and more targeted. As well as this, Mia by Kheiron Medical, a winner from the first round of the AI Awards, aims to replace the need for 2 radiologists to review breast cancer scans by instead using one radiologist and the AI, making the process faster and more efficient.

The 38 projects which are being supported by the second wave of the AI Awards include:

- an algorithm from BeholdAI that can identify suspected lung cancer in chest X-rays to increase the numbers of cancers diagnosed and reduce the time patients wait for scans
- The Paige Prostate cancer detection tool to help pathologists identify cancers and their spread in digital images to improve diagnostic accuracy and help tackle rising caseloads
- Zebra Medical's Bone Health Solutions tool to analyse existing CT scans to look for previously undiagnosed spinal fractures that could be a sign of osteoporosis to find more patients living with this undiagnosed disease, ensuring they receive appropriate advice or medication
- Mental health app Wysa – an AI-powered chatbot and series of self-care exercises which will provide mental health support, helping people manage their mental health. Patients will be given access to the app during the referral process for mental health services, to explore whether the app can ease symptoms of anxiety and depression before patients receive assessment and treatment

Matthew Gould, chief executive of NHSX, said:

> These trials are making the AI revolution a reality for patients.

> Thousands are already benefiting, from faster stroke treatment to ground-breaking home kidney testing.
>
> Today’s award winners will push NHS AI into new areas like mental health. The possibilities are immense. This work will help ensure the NHS is a world leader in safe use of AI in health and care.

Matt Whitty, Chief Executive, Accelerated Access Collaborative and Innovation, Research and Life Sciences Director, NHS England and NHS Improvement, said:

> Today’s announcement of the Artificial Intelligence in Health and Care Award winners demonstrates our backing for a broad range of innovations, including those to improve cancer care and support for our first mental health project.
>
> The NHS has the tools in place to become a world leader in testing and deploying new AI technologies that can improve patients’ lives and showcase the breadth of talent and ingenuity present throughout the UK across academia, industry and the NHS.

The AI award package also includes funding to support the research, development and testing of early phase, promising ideas which could be used in the NHS in future:

- diagnosing heart attacks – an AI-guided tool that could diagnose heart attacks more accurately and quickly through better interpretation of blood analysis
- monitoring cystic fibrosis – using AI with home monitoring equipment to predict sudden dips in the health of cystic fibrosis patients, aiming to prevent them occurring
- monitoring brain tumours – developing AI to measure the volume of brain tumours from scans to assess which are at risk of growth to ensure those patients are monitored more frequently
- improving kidney transplant outcomes – using data from 20 years of previous kidney transplants to improve the decision-making process for a patient to receive less-than-perfectly-matched donor kidneys or wait for the next available one
- detecting bowel cancer – using AI to analyse video recordings of the gastrointestinal tract, taken from a swallowable camera, to target bowel cancer and other gastrointestinal diseases

Background information

The NHS AI Lab will fund programmes to support the UK to become a world-leading, safe and ethically robust setting for the development and deployment of AI technologies. The lab has also launched an AI ethics initiative to ensure AI products will not exacerbate health inequalities, including working with the Ada Lovelace Institute to design and trial algorithmic impact

assessments.

The AI in Health and Care Award will distribute £140 million over 3 years, with the next round of applications set to open in late June.

The AI award is managed by the AAC delivered in partnership with NHSX and the National Institute for Health Research (NIHR).

Four categories of AI products are being supported:

- phase 1 – to support the demonstration of the technical and clinical feasibility of the proposed concept, product or service
- phase 2 – to support the development and evaluation of prototypes and generate early clinical safety and efficacy data
- phase 3 – to support the first real-world tests in health and social care settings of AI products or tools to develop evidence of efficacy and preliminary proof of effectiveness, including evidence for routes to implementation to enable rapid adoption
- phase 4 – to support the spread of AI products or tools that have market authorisation but insufficient evidence to merit large-scale commissioning or deployment. Successful products will be adopted in a number of NHS sites to stress test and evaluate the AI technology within routine clinical or operational pathways to determine efficacy or accuracy, and clinical and economic impact

366 applications were received which were reviewed through a series of stages including long-listing, due diligence checks, clinical and peer reviews, and interviews:

- as part of the selection process each applicant had to commit to complying with the laws and regulations that protect health and care data as well as the NHS's Code of Conduct for data-driven technologies
- those products selected for phase 4 of the award will be trialled in several NHS organisations before potentially being adopted across the health service. Each product will undergo robust testing and independent evaluation to ensure they are effective, accurate, safe and value for money
- while phase 3 technologies will see their first real word tests in the NHS to explore their benefits

The winning technologies for each phase of round 2

Phase 4

Bone Health Solutions

Zebra Medical Vision

A pilot project using AI to analyse any type of scan to catch undiagnosed spinal fractures, which can be a marker for osteoporosis. Patients will receive lifestyle advice, where appropriate, to reduce future fracture risks associated with the disease.

Paige prostate cancer detection tool

University of Oxford

Using AI to support the analysis of pathology samples and images in order to more efficiently detect and quantify cancer in biopsies, diagnosing prostate and other cancers. This addresses a rise in caseload combined with a drop in qualified pathologists, which has led to backlogs in the system.

Chest X-ray analysis

Behold.AI Technologies Ltd

Real-world testing of an AI algorithm to fast-track the diagnosis of suspected lung cancer patients, offering them same-day CT scans. Patients whose chest X-rays show no abnormalities will be flagged, and spared further procedures.

eHub

eConsult Health Ltd

Using AI to intelligently triage and automate GP e-consultation requests, reducing staff time to manage the system. eHub aims to improve clinician efficiency, and allow easier interface for GPs and admin staff with eConsult software, reducing errors and improving patient safety.

DERM

Skin Analytics Ltd

Expanding trials of the use of AI in the analysis of images of skin lesions, distinguishing between cancerous, pre-cancerous and benign lesions. DERM sets out to highlight the most likely cancers and aid in swift and appropriate treatment being offered, reducing backlogs in this service and reducing premature deaths.

Phase 3

CaRi-HEART

Caristo Diagnostics Ltd

Using AI to detect the invisible signatures of inflammation in the heart as shown in regular CT scans. This gives a better prediction of the risk of cardiovascular disease, allowing more efficient targeting of medication and treatment.

Cogstack Natural Language Processing

King’s College London

This AI-based clinical coding of medical records aims to enable more efficient analysis, remove errors, free up staff time, and improve research.

Recruitment for clinical trials will be improved, and individual clinicians will be able to analyse patient records more efficiently.

qER

Qure.ai Technologies Private Limited

Evaluation of the use of AI to support emergency department clinicians to analyse CT scans in patients with head injuries, leading to faster treatments and better outcomes for the patients. This can be vital in areas where there is a shortage of trained radiologists to analyse the scan images immediately.

ArtiQ.Spiro

Guy's and St Thomas' NHS Foundation Trust

Testing the use of AI to interpret and evaluate the spirometry test used to determine lung function, freeing up clinician time, and reducing incorrect diagnoses. Part of the NHS's Long Term Plan to combat lung disease, and reduce health inequality.

Workforce deployment solutions

Navenio Limited

Using AI to implement workforce solutions, ensuring that both clinical and support staff are in the right place at the right time within a hospital, to maximise efficiency. The programme uses smartphones for the deployment of porters, cleaners, Allied Health Professionals and others, when they are needed.

Analysing breast screening X-rays

Imperial College London

Evaluating the potential of AI for analysing X-ray images of routine mammograms (breast screening). This will improve accuracy, safety, cost-effectiveness and patient experience, giving results faster, and helping mitigate the shortage of radiographers available to analyse mammograms.

InnerEye

Cambridge University Hospitals NHS Foundation Trust

Using open-source AI and machine learning to differentiate tumour and healthy tissue on cancer scans (called 'segmenting'), prior to radiotherapy treatment. This saves clinicians' time, and reduces the time between the scan and commencing treatment.

DOLCE

Optellum Ltd

Determining the impact on healthcare services of Optellum's Lung Cancer

Prediction artificial intelligence solution DOLCE, which examines lung nodules to determine which are precancerous, without the use of expensive tests and scans, minimising worrying delays for the patient.

Lenus COPD Management Service

Storm ID Ltd

Introducing prevention and self-management to people with COPD lung disorder, using AI to analyse output from patients' daily monitoring and wearable devices. This is used to predict the worsening of COPD, enabling clinicians to prioritise patients who are most at risk.

Wysa

WYSA Ltd

Real-world testing of an AI app as an early intervention and support tool for mental health, to be used by patients on the waiting list for regular care. The aim is to reduce symptoms of anxiety and depression, and detect people experiencing severe mental health difficulties, so that they can be prioritised for treatment.

Phase 2

MyDiabetes IQ

MyWay Digital Health Ltd

MyWay Digital health is testing an AI tool for predicting diabetes complications and treatment choices, to support non-specialist GPs with managing their diabetes patients. The aim is to prevent complications, like heart attacks and foot ulcers.

BloodTyper

University of Cambridge

BloodTyper is an AI system that uses DNA to determine the sub-groups of donated blood, improving how well blood is matched to recipients. This reduces the risk of rejection, and will enable systems to be developed that use blood stocks more efficiently, and even target blood donation appeals for the most-needed blood sub-groups.

Advance notice of deterioration in cystic fibrosis

University of Cambridge / Royal Papworth Hospital NHS Foundation Trust

This project is using AI with home monitoring equipment to predict sudden dips in the health of cystic fibrosis patients, aiming to prevent them occurring, and support clinicians and patients to make good decisions without repeated hospital check-ups.

mySmartCOPD

University of Southampton

Patients with Chronic Obstructive Pulmonary Disease (COPD) are being supported to use home monitoring of various health markers, and report them using the MyCOPD app. The data are analysed by AI to predict ‘exacerbation events’, where a patient’s condition suddenly declines, in order to prevent or lessen these events.

ImageDx

Sonrai Analytics Ltd

A centralised, AI-based solution for faster and more accurate testing on cancer biopsy tissue for colorectal, lung and other cancers.

First PLUS

Perspectum Ltd

The First PLUS project uses AI to analyse the size of the placenta during the first trimester, and flag those that are abnormally small, which is an indicator for Fetal Growth Restriction. This is a risk factor for stillbirth and other neonatal conditions, as well as lifelong health issues.

CHRONOS

University of Oxford

The CHRONOS project is developing AI and natural language processing capability, to extract relevant information from patients’ health records, going back in time. This will help clinicians triage patients who are referred to mental health services, enabling swifter care, and to flag high-risk patients.

CESCAIL

Corporate Health International UK Ltd

The CESCAIL project is testing how effective AI can be in performing preliminary analysis on the hours of images taken during capsule endoscopy, saving clinicians up to 80% of the time they would usually spend on this work. The project will allow this more flexible type of endoscopy to be rolled out further in the community.

Eye2Gene

University College London, Moorfields Ophthalmic Reading Centre

Eye2Gene is exploring the use of AI to determine which genetic condition is causing a patient’s inherited retinal disease, by examining eye scans. With more than 180 possible genetic causes, requiring differing management or treatment options, swift diagnosis is crucial.

Phase 1

Issues and themes analysis in complaints

Methods Analytics Ltd

This project aims to use AI and Natural Language Processing to improve the speed, responsiveness and learning from the management of healthcare complaints, picking up key issues in individual cases, and recurring patterns across a service or area.

Machine learning to improve the diagnosis of heart attacks

University of Edinburgh

This project is developing an AI-guided tool to help doctors and nurses interpret a patient's troponin levels to diagnose heart attacks more accurately. A web app can be used on a mobile device at the bedside or embedded into hospital computer systems.

Monitoring slow-growing brain tumours

University of Cambridge

Certain types of brain tumour are deemed low-risk, as they grow so slowly. This project aims to develop AI to measure the volume of tumours from scans, and learn which are at risk of growth, to ensure those patients are monitored more frequently, and others can be reassured that their tumour is lower risk.

Pathpoint Detect

Open Medical Ltd

Pathpoint Detect is a new development for existing Pathpoint patient care workflow software, enabling it to offer decision-support tools for dermatology clinicians, based on imaging from prior cases, and previous consultant decisions.

Developing the Blood Pressure Index for improved blood pressure control

Imperial College London

Developing the Blood Pressure Index, to provide more data for patients monitoring their blood pressure, with the help of AI to monitor hypertension, the most important cause of strokes, heart disease and death.

panPIERS

King's College London

This project plans to combine the existing PIERS (Pre-eclampsia Integrated Estimate of Risk Score) tools, miniPIERS and fullPIERS, together with AI into an app to calculate an individual woman's risk of pre-eclampsia, and its potential severity, including post-birth complications.

PREVAIL – PhototheRapy Enhanced Via Artificially Intelligent Lasers

University of Southampton

The PREVAIL project is developing automatic ‘self-driving’ UVB lasers for the treatment of psoriasis, enabling only the affected skin to be targeted in high doses. This would reduce the risk of skin cancer in adjacent skin caused by the blanket use of UVB rays, and remove the need for a specialist clinician to target affected areas by hand.

Measuring hip dysplasia in children with cerebral palsy

University of Manchester

This project seeks to use machine learning to assess X-ray images of the hips of children with cerebral palsy, to determine whether they are at risk of hip dislocation, a process which can be time-consuming when carried out by clinicians.

CirrhoCare

Cyberliver Ltd

CyberLiver proposes using AI to examine the outcomes for patients with cirrhosis who experience deteriorations in their condition due to infection, to better understand which will benefit from early ICU care.

Decision-making for less-than-perfect kidney transplant matches

University of Oxford

Deceased kidney donors and potential recipients are not always perfectly matched, so this project aims to train AI to help with the decision-making process around whether clinicians should accept less-than-perfectly-matched donor kidneys, or whether to wait for a better match, by analysing the likely patient outcome in both cases.

Detecting coronary artery calcification in chest X-rays

Golden Jubilee National Hospital and University of Glasgow

Many CT scans include the heart, even if it is not the primary focus of the image. This project aims to train AI in the detection of coronary artery calcification, so that early care and treatment can be provided in advance of the patient reporting heart problems.

Predicting and monitoring pre-term labour

Coventry University

This project will explore the use of electrohysterography sensing to predict and monitor the pre-term labour of women giving birth before 37 weeks, using AI to provide more accurate data than is currently available by this or other methods.

R-CANCER

Imperial College London

R-CANCER will improve the quality of decisions made by doctors when deciding how best to detect and diagnose cancer, by intelligently collating, analysing and interpreting new data on cancer from academic and open data sources.

Diagnosis of ‘glue ear’ with AI

Cardiff Metropolitan University

This project aims to test the use of AI to accurately diagnose ‘glue ear’ (Otitis Media with Effusion) in children, preventing delayed or incorrect diagnoses, and reducing complications and recurrent issues.

About the NHS AI Lab

The NHS AI Lab is a focal point to accelerate the safe adoption of AI into the front line of health and care. It brings together government, the NHS, academics and technology companies to help tackle some of the toughest challenges in health and care.

The NHS AI Lab believes in creating a sustainable health and care system which achieves better outcomes, equality and fairness for all. We want to support AI technologies that have potential to improve the quality of health and care services while building a robust ethical and regulatory framework to ensure patient and citizen safety.

About the Accelerated Access Collaborative

The Accelerated Access Collaborative brings together industry, government, regulators, patients and the NHS to remove barriers and accelerate the introduction of ground-breaking new treatments and diagnostics which can transform care. The AAC supports all types of innovations: medicines, diagnostics, devices, digital products, pathway changes and new workforce models.

About NIHR

The NIHR is the nation’s largest funder of health and care research. The NIHR:

- funds, supports and delivers high quality research that benefits the NHS, public health and social care
- engages and involves patients, carers and the public in order to improve the reach, quality and impact of research
- attracts, trains and supports the best researchers to tackle the complex health and care challenges of the future
- invests in world-class infrastructure and a skilled delivery workforce to translate discoveries into improved treatments and services

- partners with other public funders, charities and industry to maximise the value of research to patients and the economy

The NIHR was established in 2006 to improve the health and wealth of the nation through research, and is funded by the Department of Health and Social Care. In addition to its national role, the NIHR supports applied health research for the direct and primary benefit of people in low- and middle-income countries, using UK aid from the UK government.