From research to reality

Literature review

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Literature review

The first aim of this piece of work was to rapidly understand the current political, policy and industry context for health and science.
To achieve this, Nesta Group conducted a rapid review of the available literature.

First, we explored the existing policy landscape, aiming to answer the following questions:

1. What are the known or emerging priorities for population health?
2. What governance and decision-making processes are being established to set priorities and guide health system activity?
3. What does the UK's health research infrastructure currently look like?
4. What are the known or emerging priorities for the health science and innovation ecosystem?
5. What changes have we seen in recent years that necessitate an update of previous narratives about health and science?

We next aimed to understand how the existing system could be improved, by exploring the question:

6. Considering emerging health system priorities, what are the current strengths and weaknesses of the corresponding health research and innovation activity?

The findings from the evidence review are set out on page 3.

1

What are the known or emerging priorities for population health?

The NHS is facing unprecedented challenges, as highlighted in Lord Darzi's investigation. An ageing population, ever more complex patient needs and multimorbidity, and the impact of preventable diseases increase pressures on a creaking system, made even more precarious following the COVID-19 pandemic.

The fiscal burden of increasing ill health is considerable in the medium term, due to rising health-related inactivity, and longer term: rising health spending represents the largest driver of the projected increase in government debt.

We have identified six key priorities for population health, drawing on the Government's aim to build an NHS fit for the future, detailed in three big shifts, the Government's Health Mission, and the Labour 2024 manifesto:

1. **Moving from hospital to communities:** moving more care delivery from hospitals to home and community settings to enhance convenience and reduce hospital pressures.
2. **Moving from analogue to digital:** accelerating digital transformation to improve accessibility and efficiency, including digital consultations, records, and remote monitoring.
3. **Moving from sickness to prevention:** emphasising preventive healthcare to reduce the incidence of and morbidity from chronic diseases and promote healthier lifestyles. This is supported by the Chief Medical Officer's five point prevention plan, focusing on smoking, alcohol, obesity, physical activity, and air quality; and focus on public health priorities including online harms, and gambling harms.
4. **Speeding up treatment:** reducing delays in accessing NHS services and achieving waiting time standards for ambulances, A&E, and GP and hospital appointments.
5. **Increasing healthy life expectancy (HLE):** reducing the impact of key conditions on self-reported health, considering the impact of multimorbidity, and reducing mortality from key preventable illnesses. Considering multimorbidity will involve a multipronged life course approach to addressing complex needs to ensure that the right intervention reaches the right person at the right time.
6. **Tackling inequality:** halving the gap in HLE between regions and addressing the social determinants of health[1]: driving poverty reduction, focusing on child poverty; improving housing; investing in early childhood development; raising educational standards; and addressing skills shortages to drive employment. This priority also incorporates a focus on women's health.

These key priorities will be supplemented by additional priorities in the 2024 manifesto: reforming social care; improving mental health services and dentistry; increasing patient safety and involvement in care; and prioritising women's health.

2

What governance and decision-making processes are being established to set priorities and guide health system activity?

The Government will publish a 10 Year Health Plan in Spring 2025. This will be informed by a series of working groups to support policy development.

These include four Vision Boards, running until 20th December, which will each focus on one of the following statements:

- I can stay healthy and manage my health in a way that works for me
- I can access the high-quality and effective care I need, when and where I need it
- My care is centred around my needs and I am listened to
- I am treated in a fair and inclusive way, irrespective of who I am

The Vision Boards will inform seven Enabling Boards, running until 28th February. These Enabling Boards will each focus on one of the following subjects:

- People
- Finance and contracting
- Physical infrastructure
- Data and technology
- Research, life sciences and innovation
- Accountability and oversight
- Mobilising change

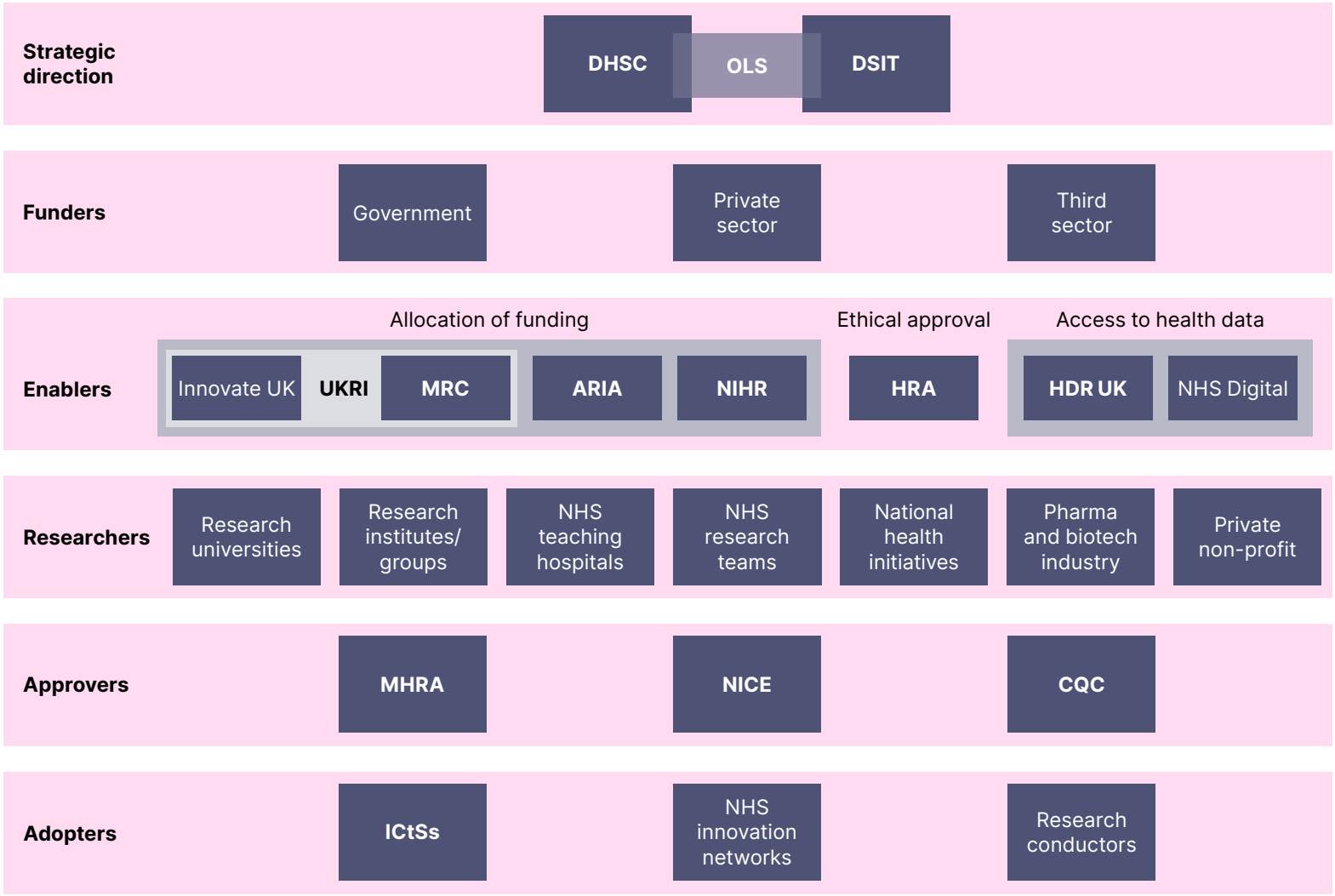
The 10 Year Plan will be co-designed with the public and health staff through online and in-person deliberative engagement, as well as stakeholder discussions.

3

What does the UK's health research infrastructure currently look like?

The UK's health science and innovation ecosystem involves key players across various sectors, including researchers, funders, adopters and implementers, and system shapers.[2] These key players, and their roles, are summarised in the figure on page 7 and then subsequently described in further detail.

Figure 1. Overview of health research infrastructure



Key

DHSC: Department of Health and Social Care; OLS: Office of Life Sciences; DSIT: Department for Science, Innovation and Technology; UKRI: UK Research and Innovation; MRC: Medical Research Council; ARIA: Advanced Research and Invention Agency; NIHR: National Institute for Health and Care Research; HRA: Health Research Authority; HDR UK: Health Data Research UK; MHRA: Medicines and Healthcare Products Regulatory Agency; NICE: National Institute for Health and Care Excellence; CQC: Care Quality Commission; ICS: Integrated Care Systems.

Strategic direction

Government bodies and policymakers

Government bodies and policymakers are central to shaping the UK's health research agenda, providing strategic direction, setting policy priorities, and ensuring the alignment of research funding with national health goals. These entities play a crucial role in defining health priorities, establishing frameworks for innovation, and fostering collaborations across sectors.

The Department of Health and Social Care (DHSC) is responsible for the overall health policy framework in the UK, overseeing the NHS and public health. It plays a central role in ensuring that health research aligns with national health priorities and that new treatments or technologies are integrated into the NHS efficiently (e.g. DHSC has accelerated efforts to expand digital healthcare in response to the Covid-19 pandemic; DHSC's Vaccine Taskforce). The DHSC works closely with the Office for Life Sciences, regulatory bodies, and other stakeholders to create an environment conducive to research translation and the adoption of innovation in practice.

The Office for Life Sciences (OLS) operates within DHSC, and sets the strategic direction for the life sciences sector in the UK. Through initiatives like the Life Sciences Vision (see Life Sciences Vision Missions), the OLS outlines national goals for health research and innovation, with a particular focus on public-private partnerships. The Vision highlights key areas such as cancer, mental health, and antimicrobial resistance, and sets out missions to address these challenges, guiding investments and research efforts to meet the nation's health needs.

Public-private partnerships

Public-private partnerships are key mechanisms for translating research into practical, scalable solutions in the healthcare sector. These partnerships enable collaboration between government, healthcare providers, academic institutions, and private industry, pooling resources, expertise, and innovation to achieve targeted health outcomes.

A prominent example of a public-private partnership is the "Hep C U Later" initiative (a collaboration between the NHS and Gilead Sciences), aimed at eliminating hepatitis C across the UK. This initiative was born out of a recognition by both parties of the potential of new antiviral therapies to cure hepatitis C. The partnership enabled the integration of these treatments into community care services, addressing public health objectives through targeted interventions.

Research funders

Public funders

Government funding for health research in the UK is primarily allocated by DHSC, which sets budgets and priorities based on public health needs. Funds are distributed to key agencies such as the National Institute for Health Research (NIHR) and the Medical Research Council (MRC) to support research in critical areas such as cancer, mental health, and cardiovascular disease. Research priorities are shaped by input from healthcare professionals, public health data, and societal needs, with funding opportunities announced through calls for proposals.

The NIHR plays a pivotal role in connecting NHS trusts with funding sources, enabling large-scale clinical trials that address urgent healthcare challenges, such as the RECOVERY Trial. It strengthens the NHS's capacity to implement evidence-based improvements in care (e.g. Dhanda et al., 2024). Through a competitive, peer-reviewed process, NIHR oversees the selection and funding of research projects, ensuring alignment with national health priorities and driving innovation to improve healthcare outcomes.

In addition, UK Research and Innovation (UKRI), the nation's largest public funder, channels resources through bodies like the MRC to support foundational and translational research. This approach ensures that early-stage discoveries are developed into clinical applications that benefit patients, exemplified by initiatives such as the UK Biobank and the Data Infrastructure for Covid-19 Research.

The Advanced Research and Invention Agency (ARIA) further complements these efforts by funding high-risk, high-reward projects in health science, scalable solutions, and system resilience. ARIA's mandate to innovate allows it to back ambitious projects that may not secure traditional funding but hold the potential for transformative breakthroughs, such as Precision Neurotechnologies. Together, these agencies and processes create a comprehensive framework for advancing health research in the UK.

Third sector funders

Charitable organisations, including the Wellcome Trust and Cancer Research UK, are vital in funding high-impact biomedical research, particularly in areas such as cancer and infectious diseases. Their open-access funding model supports research that benefits the broader healthcare community.

Private funders

Industry funding supports a large proportion of UK health research, across diverse sectors including pharmaceuticals, biotech, medtech, and diagnostics. Pharmaceutical companies, such as Lilly, also contribute to UK-based life sciences by funding clinical trials, investing in research, and forming partnerships with the NHS. However, while pharmaceutical companies often prioritise research on their own drugs, some, like Novo Nordisk through its foundation and charitable arm, fund related research focusing on broader health goals, such as disease prevention.

Research enablers

Maintaining ethical standards in research

All research studies involving people as participants require review by a research ethics committee (REC). For certain types of research, such as those involving NHS patients, ethical review is sought from one of the Health Research Authority's NHS RECs.

The Health Research Authority (HRA) is a UK government-funded regulatory agency responsible for overseeing the ethical and legal standards in health research. It provides frameworks and governance to ensure that research in the UK meets ethical standards, especially in relation to patient safety, data protection, and transparency. The HRA also manages the Integrated Research Applications System (IRAS), a platform designed to streamline the approval process for health research, enabling faster and more efficient study initiation. By regulating and facilitating the ethical approval process, the HRA ensures the research landscape aligns with national healthcare policies and laws.

Research that does not require NHS REC review may need ethical approval from another REC, such as a university.

Health data infrastructure

NHS Digital securely collects and stores comprehensive patient data across a range of healthcare settings. This data repository is vital for real-world studies, epidemiological research, and health systems analysis (e.g. Covid-19 Data Store). Through strict data governance and security protocols, NHS Digital makes it possible for approved researchers and institutions to leverage patient data for health research initiatives.

Health Data Research UK (HDR UK) is the national institute for health data science. Its mission is to make health data accessible for research by connecting and curating datasets from multiple sources across the UK. By linking data from the NHS, research institutions, and biobanks, HDR UK enables real-world studies and AI-driven solutions that can analyse patterns in health conditions, enhance disease prevention, and refine treatment protocols (e.g. BREATHE). HDR UK develops data-sharing frameworks that prioritise security and transparency, balancing innovation with patient privacy.

Research institutions

Leading UK universities, such as Oxford, Cambridge, University College London (UCL), Edinburgh, Manchester and Imperial College London, conduct a significant portion of the country's biomedical and clinical research (e.g. Covid-19 Vaccine - Oxford; Cardiovascular and Respiratory Diseases – Cambridge; Dementia – UCL; AI for healthcare – Imperial).

These institutions, often in collaboration with NHS teaching hospitals such as Great Ormond Street Hospital (e.g. CART Cell Therapy) and Moorfields Eye Hospital (e.g. Bionic Eye Implant), are pivotal in areas such as genetics, health policy, and clinical sciences. By working closely with hospitals, they bridge theoretical research and clinical application, directly impacting patient care.

Pharmaceutical and biotech industries, including companies like AstraZeneca (see impact report), GSK (see annual report), and Pfizer (see impact report) also invest heavily in research and development (R&D) and frequently collaborate with the NHS and NIHR for clinical trials, accelerating the development of new treatments. Medtech and biotech firms contribute further by creating digital health and diagnostic tools in partnership with NHS Digital and NHS Clinical Research Network, enabling more efficient and data-informed healthcare delivery (e.g. SURMOUNT-REAL UK; Cyted; Dolezalova et al., 2023; Ng et al., 2023).

Additionally, national health initiatives such as Genomics England's 100,000 Genomes Project, Centre for Longitudinal Studies' British birth cohort studies, and Our Future Health, the UK's largest health research programme, provide data resources that drive research in precision medicine and population health. Combining genetic, lifestyle, and long-term health data from diverse UK populations, these projects enable researchers to understand how genetic and environmental factors affect health over a lifetime, helping to shape personalised treatments and preventative healthcare strategies.

Approvers and adopters: translating research into practice

The effective translation of research into practice is supported by organisations that facilitate the adoption of new innovations while ensuring adherence to quality standards. Approvers in the UK healthcare system include the National Institute for Health and Care Excellence (NICE), the Medicines and Healthcare products Regulatory Agency (MHRA), and the Care Quality Commission (CQC).

Once research shows promising results, the MHRA regulates and approves the safety and efficacy of medicines and medical devices, ensuring that they meet safety standards before being introduced to the market. Once licensed by the MHRA, NICE reviews the evidence, providing guidance on which treatments and technologies should be recommended for use within the NHS based on their clinical and cost-effectiveness. Once approved, NHS providers and healthcare professionals can adopt these innovations into their practices, applying evidence-based treatments to improve patient care. The CQC then inspects healthcare services to ensure that the new treatments are being implemented safely, ethically, and in line with regulatory standards, safeguarding patient welfare and promoting high-quality care. This structured process ensures that innovations are rigorously evaluated, safely introduced, and continually monitored to benefit patient care (e.g. Navigating the Future).

Regional Health Innovation Networks (HINs) and NHS innovation hubs, often in collaboration with academic institutions, support the adoption and spread of research-backed innovations. These networks help standardise best practices, provide training and support, and foster collaboration between clinicians, researchers, and innovators. HINs and NHS innovation hubs support scaling and integrating research-backed innovations into healthcare systems across the UK. For example, the Making Diabetes Self-Management Accessible project was initially piloted in South London by HIN, aiming to improve diabetes care by empowering patients to manage their own condition. After proving successful at a local level, the model was scaled to other parts of England. The project helped standardise care practices and incorporated innovative digital tools, such as apps and telehealth, to support patients in monitoring and managing their diabetes more effectively.

Other examples include: the getUBetter project, first piloted in HIN West of England in 2013 and now available to 20 million people; and the Safety Medication Dashboard (SMASH), an IT system designed to prevent hazardous prescribing, first piloted in Salford between 2015-18 and now scaled across the whole of Greater Manchester.

Together, these approval and adoption mechanisms should create a robust infrastructure for embedding evidence-based innovations into practice, ensuring that the NHS remains responsive to the latest research while maintaining high-quality care standards.

For a comprehensive review of public and charity-funded health research in the UK, the UK Health Research Analysis Report 2022 provides detailed insights into the landscape of health research funding in the UK, including data from 173 organisations and covers an estimated total spend of over £5 billion.

4

What are the known or emerging priorities for the health science and innovation ecosystem?

The health science and innovation ecosystem in the UK focuses on leveraging research and innovation to address pressing health challenges while fostering economic growth. The Government's priorities and overarching goals reflect a commitment to advancing life sciences and ensuring health equity through targeted investments and collaborations.

The Government's life sciences strategy

The Government's plan for life sciences revolves around four central goals:

- **NHS as an Innovation Partner:** To position the NHS as a central force driving healthcare innovation by: strengthening connections between healthcare delivery and research initiatives; leveraging infrastructure and data to support translational research; and facilitating the adoption of innovative solutions in clinical practice.
- **Increased Investment in Life Sciences R&D:** To grow public and private investment in life sciences research, strengthening the UK's position as a global leader in biomedical innovation.
- **Optimising NHS Health Data for Research:** To expand the use of NHS health data to support cutting-edge medical research and innovation, while ensuring ethical practices and safeguarding patient privacy. Streamlined patient recruitment for clinical trials will also enhance the speed and quality of research outputs.
- **Improving Access to Finance:** To address financial barriers for early-stage and scaling companies in the life sciences sector by improving access to capital and fostering a more supportive investment ecosystem.

To operationalise these ambitions, the Government's policy agenda outlines several priority actions. First, it advocates for **stable and long-term public R&D funding**. This includes increasing public sector funding to stimulate private investment, ensuring that health science research is sustainable and well-planned over the long term. The policy also aims to support cross-sector collaboration to drive large-scale initiatives in emerging fields such as genomics, digital health, and personalised medicine.

In addition, the Government aims to **harness NHS data for medical research** by expanding infrastructure for data sharing and analysis. This expansion will underpin advances in precision medicine and public health while enhancing public trust in the use of health data by establishing robust governance frameworks.

Regulatory modernisation and improvements to the business environment seeks to reform the UK's regulatory environment to make it more agile and attractive to international investors and innovators. It also promotes the introduction of incentives to foster research collaborations between academia, industry, and healthcare providers.

The Government's agenda also aims to **boost clinical trial capacity and access**. This includes reducing bureaucratic barriers to clinical trial participation and improving trial diversity, ensuring that research outcomes are more representative of the UK population.

Finally, to support innovation, the Government proposes **facilitating access to finance** through introducing targeted financial mechanisms. These will help startups and scale-ups navigate the 'valley of death' in innovation (the phase in the innovation process when new ideas fail to progress due to a lack of funding or support), supporting their growth and success in the competitive landscape of health science research.

In addition, the Government's Life Science Vision focuses on five Vision Missions:

- **Dementia mission:** to develop innovations in biomarkers, data and digital sciences, and increase the number and speed of clinical trials in dementia.
- **Cancer mission:** to make the UK a leading testbed for oncology innovation by accelerating the development and commercialisation of a new generation of cancer diagnostics and therapeutics (including cancer vaccines), allowing patients to be diagnosed earlier and offered therapies specifically designed to target their cancer.
- **Obesity mission:** to explore how new and potentially transformative innovations for the treatment of obesity can be accelerated and combined to improve long-term health outcomes for people living with obesity and associated conditions.
- **Addiction mission:** to transform the ecosystem for drug and alcohol addiction research in the UK: better linking multidisciplinary researchers and treatment delivery partners with industry and innovators, enhancing research capacity and the ability to deliver novel patient research, and accelerating the development, testing and use of innovations targeting addiction.
- **Mental health mission:** to address the significant unmet need for new treatment options for people with mental health conditions and establish the UK as the place to undertake innovative mental health research.

Current and future funding directions

The NHS, UKRI, and NIHR are all prioritising healthcare innovation, particularly in the fields of mental health, chronic disease management, and technology-enabled care.

National Health Service

NHS England is actively seeking solutions to transform care in high-priority clinical areas. In collaboration with NICE, several key priorities have been identified. These include developing digital platforms for cardiac rehabilitation to enhance patient care and improve recovery outcomes. Additionally, self-management tools for conditions such as osteoarthritis, asthma, and menopause empower patients to take greater control of their health.

Mental health innovations are also a critical focus, with a particular emphasis on self-management therapeutics and providing support for young people dealing with eating disorders. Addressing Serious Mental Illness (SMI) care is another significant priority, with a focus on improving early interventions and ensuring that those affected by these conditions receive timely and effective treatment. Early intervention in cardiovascular diseases is a further priority, as NHS England seeks to identify and treat patients at risk before conditions become more severe, improving outcomes and reducing the burden on the healthcare system.

As technology evolves, self-management devices like smartwatches and Samsung's Galaxy Ring are transforming healthcare by enabling personalised health monitoring. Challenge Works is advancing this shift by connecting researchers and technologists to tackle global health challenges. For example, they are offering a prize to foster collaborations that develop wearables to monitor and predict pain flares, revolutionising pain management and improving patient outcomes.

UK Research and Innovation

UKRI strategically focuses its funding on research that aligns with and complements NHS priorities, with a particular emphasis on several key areas. One focus is developing novel human in vitro models for complex diseases, which will help researchers better understand the underlying mechanisms of these conditions and create more effective treatments. Additionally, UKRI is prioritising research in neurosciences, mental health, and innovations in medical devices, therapeutics, and diagnostics, in line with the broader goals of improving patient care and advancing the UK's life sciences strategy.

Progress in these fields is already apparent. For example, the UK's approval of Casgevy, a CRISPR-based treatment for sickle cell disease and β-thalassaemia, underscores the potential of gene editing technologies to revolutionise treatment. The cell and gene therapies market is expected to grow significantly, from £5.3 billion in 2022 to £19.9 billion by 2027, indicating a significant shift toward personalised medicine. In the field of neurology, the development of 23 new therapies for Alzheimer's disease is driving a 20% annual market growth, with projections indicating the market will reach £13.7 billion by 2030. Furthermore, advancements in genetic analysis are enabling better predictions of psychiatric disorders, enhancing both prevention and treatment strategies. These advancements are vital in pushing the boundaries of medical innovation and improving healthcare outcomes in the UK.

National Institute for Health and Care Research

NIHR is funding a broad range of projects aimed at improving public health and healthcare outcomes. Its priorities include applied health and care research through the Research for Patient Benefit (RfPB) programme, which supports innovative projects that address regional unmet patient needs. In addition, increasing focus on climate, health, and sustainability directs funding towards research exploring how climate change impacts health and how healthcare systems can become more sustainable and resilient.

Current and emerging priorities for health data

The Government's focus on digital health data and artificial intelligence (AI) is increasingly shaping healthcare innovation. Under the Department for Science, Innovation and Technology (DSIT), there is a clear push towards integrating AI and digital technologies into health services, improving patient experiences, and boosting public sector efficiency. Key initiatives include the National AI Strategy, aiming to make the UK a global leader in AI, particularly within healthcare; the Data Ethics Framework, guiding the ethical and transparent use of data; and the Federated Data Platform, improving data sharing across NHS systems to enable better patient outcomes.

These efforts are also supported by the Rural Connectivity Programme, designed to improve connectivity in remote areas to ensure equitable access to AI-driven healthcare services. A critical priority across these initiatives is ensuring that AI systems are designed with input from patients and healthcare professionals, addressing fairness, transparency, and equity in data usage. Additionally, bridging the digital divide and improving data interoperability across health providers are emerging priorities to ensure that technologies like AI can be used safely and effectively in healthcare.

5

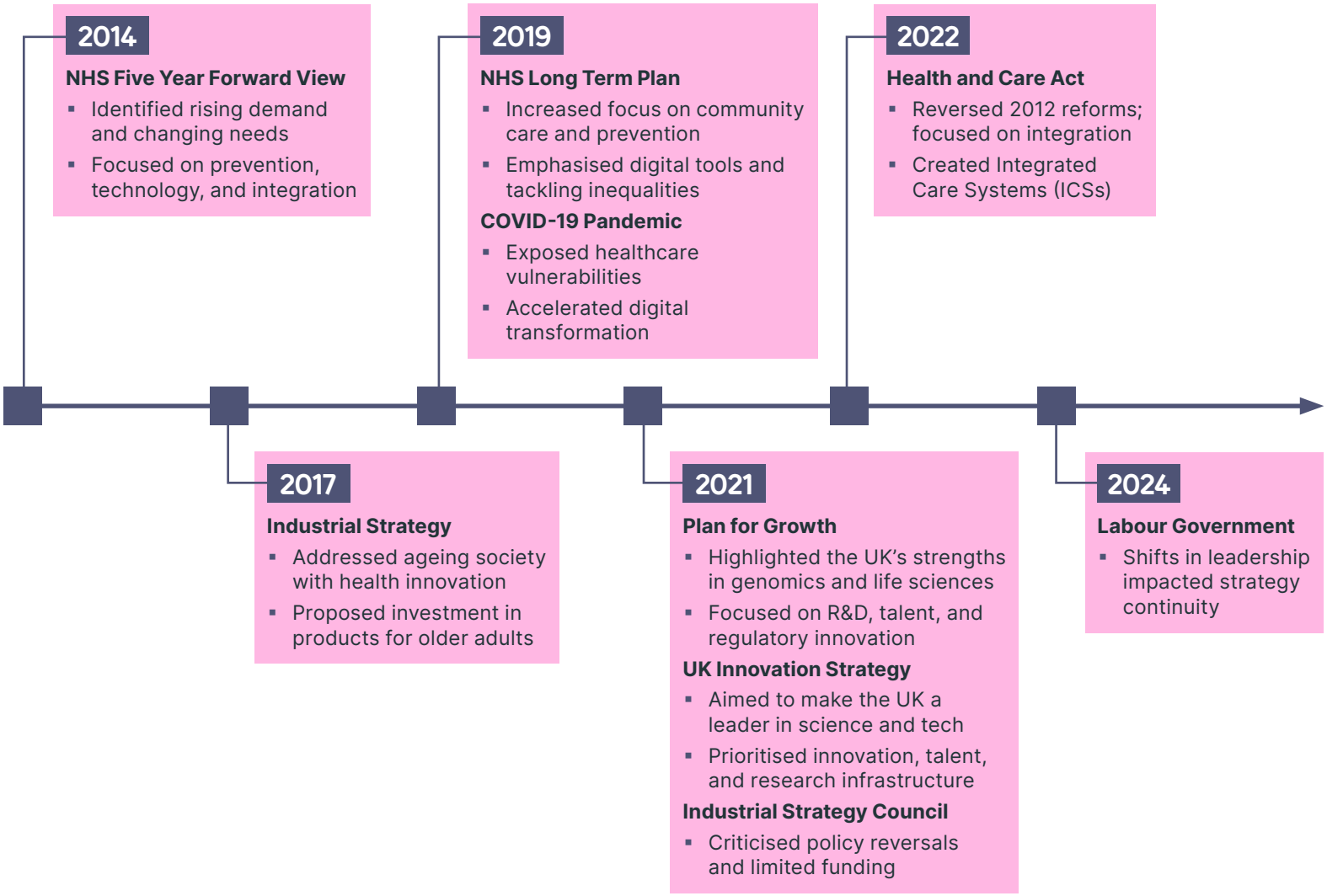
What changes have we seen in recent years that necessitate an update of previous narratives about health and science?

Previous narratives around health and science

Previous plans for the NHS cite similar challenges to today and echo similar narratives to the Government's three shifts, emphasising prevention, care in the community, and digital and technical innovation.

- The 2014 5 Year Forward View outlined similar challenges to those currently facing the NHS, including rising demand and changing patient needs. The plan focused on prevention, empowering patients, engaging with communities, and breaking down traditional barriers between different types of care. The plan also emphasised the importance of improving health technology and improving the ability of the NHS to do research and use innovation.

Figure 2. Evolving narratives in health and science: timeline



- The 2019 NHS Long Term Plan aimed to improve patient care by increasing investment in out-of-hospital primary and community care, offering more personalised care options, and leveraging digital technology to promote better support and joined-up care. The plan also focused on prevention and tackling health inequalities by targeting funding to areas with greater needs and implementing specific prevention programmes to address key risk factors.

- The 2022 Health and Care Act reversed much of the 2012 Lansley reforms, introduced by the 2012 Health and Social Care Act, returning to greater integration and reversing the focus on 'choice and competition'. The Act established Integrated Care Systems (ICSs) to coordinate services and address local health needs more effectively. It also aimed to streamline decision-making in the NHS and reduce bureaucracy, giving the NHS more flexibility while emphasising a collaborative approach between healthcare providers, local authorities, and other stakeholders.

Previous narratives around science and innovation

Similarly, previous government narratives around science and innovation overlap with each other and with the current government's focus:

- The 2017 Industrial Strategy, published under the May government identified four "Grand Challenges" to put the UK at the forefront of future industries, including harnessing the power of innovation to meet the needs of an ageing society. To support this particular challenge, the report proposed investing in new products and services for older people and leveraging UK health data to improve health outcomes and UK leadership in life sciences. The Industrial Strategy Council reported that 60% of the strategy's policies had been implemented by the time the strategy was withdrawn.

- The 2021 Plan for Growth, published under the Johnson government and replacing the Industrial Strategy, highlighted the UK's strength in life sciences, particularly in areas like genomics and digital health, and aimed to leverage this strength to create economic opportunities across all regions of the UK. The report outlined plans to build on this success by investing in R&D, attracting global talent, and creating a regulatory environment supporting innovation in the life sciences sector. Following the Plan for Growth, the Government increased investment in R&D and took steps towards a more innovation-friendly environment, such as the £200m Life Sciences Investment Programme. However, ongoing challenges include access to funding, particularly for small biotech companies, regulatory restrictions limiting data-sharing, and ongoing skills gaps.

- The 2021 UK Innovation strategy, published under the Johnson government, committed to strengthening innovation across sectors including healthcare to make the UK a global leader in science and technology across four pillars: fueling businesses who want to innovate; making the UK attractive to innovation talent; ensuring that research, development and innovation institutions serve the needs of businesses and places across the UK; and stimulating innovation to tackle major challenges and drive capability in key technologies.

- The Productivity Institute emphasises the frequent policy reversals and announcements characterising UK industrial policy since the 1970s, leading to policy inconsistency and poor coordination. Similarly, annual reports from the Industrial Strategy Council (2020, 2021) criticised the insufficient longevity, scale, and coordination necessary for successful industrial policy, also noting inadequate knowledge and awareness of the industrial strategy among relevant business and societal stakeholders. Additionally, the reports noted that most policies in the industrial strategy had limited or no associated funding, and advised greater prioritisation for a more focused and achievable approach that would also support better understanding and engagement from stakeholders.

More broadly, the proliferation, overlap, and variety of recent strategies suggests that synthesis would be valuable.

Challenges to and opportunities for traditional healthcare models

Direct challenges to traditional healthcare models

Seven key trends present challenges for the health and care system:

- **Increasing population age:** The UK population is growing and ageing, which will increase demand for healthcare services. This will strain systems, families and individuals, and require a larger working-age population to support a larger older population.
- **Increasing population diversity:** Increasing ethnic diversity may require the health and care system to adjust to meet different needs, such as ensuring adequate organ and blood supplies from ethnic minority donors. Increases in certain diseases, such as sickle-cell in black communities, will change demand for health services.
- **Changing behaviour and environment**: Lifestyle choices and environmental factors, such as obesity, smoking, and alcohol consumption, have a significant impact on health outcomes.
- **Increasing antimicrobial resistance:** The growing resistance to antibiotics and other antimicrobial drugs poses a serious threat to global health, potentially leading to untreatable infections. This may require substantial investment in research and development to discover and develop new antimicrobial drugs, as well as reshaping the incentives for developing antibiotics designed for limited use as 'last resort' drugs.

- **Changing climate**: Climate change can have direct and indirect impacts on health. While deaths related to cold may decline, outcomes such as heat-related illnesses, respiratory problems, greater extreme weather, and the spread of infectious disease present a threat to health and care systems, particularly given the UK's lack of preparedness for severe heat. However, responses to climate change such as increasing use of electric vehicles and renewable energy sources may improve health, such as through reduced air pollution.

- **Increasing outbreaks and pandemics:** Future disease outbreaks and pandemics are likely, influenced by population movement and climate change, posing significant risks to global health and requiring robust preparedness and response systems. Despite improvements in the UK's pandemic preparedness since COVID-19, the potential for more devastating pandemics remains a threat.

- **Increasing economic inequalities:** Growing economic disparities can worsen health inequalities due to the social determinants of health – the non-medical factors such as education, income, housing, employment, social support, and access to resources that influence health outcomes. In addition, those with lower incomes often face barriers to accessing quality healthcare. This presents a threat to health systems and is unlikely to improve without significant social and economic policy changes.

Economic and political shifts

Changes in the wider economic and political context of health and science also impact the healthcare system:

- **Constrained public finances:** Limited public funding, determined by political budgetary decisions, presents challenges for health and social care systems, requiring difficult decisions about resource allocation and prioritisation. These tight finances, combined with pressures on public services and geopolitical uncertainty, threaten to increase unmet needs.

- **Changing public expectations:** People are increasingly informed and engaged in their healthcare, and their expectations are evolving with access to information and technology. Low public trust in the healthcare system and the government presents a significant threat, impacting health-seeking behaviour and adherence to public health messaging. Concurrently, public participation in clinical trials is also declining, in conjunction with declining participation in health behaviours such as vaccination and screening for illnesses such as cervical and breast cancer.

- **Changing working patterns:** The rise of remote and flexible working is transforming the workplace, which can have implications for both healthcare workers and patients. This shift may lead to retention issues for healthcare professions if flexible working models are not adopted.

- **Global power shifts:** Shifting global power dynamics can influence the availability of resources, access to technology, and international cooperation in health, presenting both opportunities and challenges. These power shifts have the potential to expand life sciences markets, benefiting the NHS through economies of scale.

Opportunities to address these challenges

Emerging changes also present opportunities to address these challenges. The context of the fourth industrial revolution, the technological transformation of the 21st century, provides direct technological developments, such as AI, as well as an opportunity and catalyst for broader change. Potentially transformative developments related to life sciences and healthcare include:

- **Increasing personalisation:** Advances in genomics and other fields are enabling more personalised approaches to healthcare, tailoring treatments to individual patients' needs and characteristics, such as personalised cancer vaccines. This approach may shift care from hospitals to the community setting, and will be supported by rapid big data analysis.
- **New medicines and treatments:** Ongoing R&D, leading to new and innovative medicines and treatments, offers hope for better healthcare outcomes, particularly for conditions like cancer and dementia. New developments include pharmacological approaches to challenges like smoking cessation and obesity (such as GLP-1s and similar treatments), and new applications of stem cell technology such as to tackle type 1 diabetes. The broader applicability of novel innovation also shows promise, such as the potential promise of GLP-1s to tackle a much wider portfolio of diseases than the original designation of diabetes.
- **Increasing use of AI and automation:** The use of AI and automation in healthcare has the potential to improve efficiency, productivity, and patient care. This also encompasses the potential for data science and rapid analysis of large-scale datasets to develop rapid insights.

Key events shaping health and science narratives

In addition to longer-term trends, discrete events also reshape previous narratives about health and science.

The **COVID-19 pandemic** had wide-ranging impacts on health and science. On one hand, it significantly increased public support for the NHS, as well as the call for greater investment in health infrastructure. However, it also exposed underlying weaknesses in the system and compounded existing challenges, such as the growing burden of waiting lists. These issues have fueled the impetus for urgent reform and change within the healthcare system. The response to the pandemic highlighted the strength and agility of the UK's life sciences sector.

The effective collaboration between the state and the private sector worked together at an unprecedented speed to meet the challenges posed by the crisis, bolstered by prior foundational investment in life sciences. This allowed for quick advancements in research and development. Additionally, the pandemic and lockdowns accelerated the adoption and development of digital health technologies, such as telemedicine and health data tracking systems. While these innovations offered significant benefits in terms of accessibility and efficiency, they also raised important ethical and privacy concerns, particularly regarding data security and the implications for patient confidentiality.

The **recent change in government** represents an opportunity to redefine previous narratives around health and science. The Government's mission-based approach aims to overcome the previous cross-departmental silos that have hindered cohesive policy-making in these areas. In contrast to many criticisms of past industrial policies, the Government's industrial strategy positions life sciences as a core sector that drives economic growth. The strategy explicitly calls for investment to meet long-term needs, emphasising the importance of policy consistency. This consistency will enable businesses and individuals to make informed, long-term decisions and investments.

The Government's strategy also highlights the importance of partnerships, particularly those that involve business, civil society, and trade unions, in fostering a collaborative environment for growth and innovation. In its consultation on the industrial strategy, the Government advocates for moving away from rapidly changing policies, proposing the establishment of a statutory Industrial Strategy Council. This council would help ensure a stable, long-term focus and provide the certainty needed for sustained investment in key sectors like health and science.

6

Considering emerging health system priorities, what are the current strengths and weaknesses of the corresponding health research and innovation activity?

The UK is a global leader in health research, supported by unique strengths: a single unified health system offering access to comprehensive health data, a thriving life sciences sector, and a collaborative research culture.

Government investment, strong regulatory systems, and NHS support for innovation foster a competitive environment, while the alignment of key players such as NICE with national-level priorities, and programmes like the NHS Innovation Accelerator aim to deliver rapid adoption of impactful innovations at scale.

In practice, however, the flow of ideas and innovation through the system does not occur as smoothly as it appears on paper. The NHS Innovation Ecosystem Programme reported that while there are lots of innovative health and care products, successful implementation and scaling remain a challenge, lacking national support. While the NHS has begun to conduct formal demand-signalling processes, in practice innovation is primarily supply-side driven, rather than demand-driven, and there is a need for better alignment of all elements of the innovation and research infrastructure.

In the following section, we outline the strengths and weaknesses of the current health research ecosystem for each of the seven governmental areas of priority.

Hospital to community

Within the priority focus of the shift from hospital to community, innovation activity aims to allow people to remain at home, supported by improvements in monitoring to prevent clinical decline. NHS demand signalling of innovation areas of need has a strong focus on self-management strategies.

NICE approvals for treatments managed in the community supports greater community delivery of care. For example, NICE early value assessment guidance on virtual ward platform technologies for acute respiratory infections was developed as part of NICE's new Health Technology Assessment Innovation Laboratory (HTA Lab) programme to assess innovative health technologies. NICE has recommended the use of algorithm-based technology to monitor people with heart failure to reduce hospitalisation; heart failure is one of the leading causes of avoidable hospitalisation in the UK.

The new technology has been shown to reduce hospitalisation by over 50% and is already being used in some NHS Trusts. Further guidance is in development for similar innovations, such as Medtech for Community Musculoskeletal support. Regulatory approval of GLP1s provides a further opportunity for community-based management of conditions, such as the clinical trial of Mounjaro in Manchester, testing the impact of the drug on employment among people living with obesity.

A key focus of community care relates to neurological conditions such as dementia. Dementia is a priority area for NICE, as well as for the Government, with medicines and diagnostic tools being developed. While NICE did not recommend the use of the new Alzheimer's treatments donanenmab and lecanemab in the NHS, NICE has identified around 27 products that it expects to be asked to evaluate over the next few years, suggesting that there is a strong pipeline of innovation that could grow with more resources. NICE is also reviewing its guidance on the diagnosis and care of people with dementia to ensure patients get the best care possible while new and emerging medicines are still in their infancy.

However, pressures on clinicians limit their ability to engage with research, both in conducting research, as clinician-led research is declining at an "alarming rate" and in adoption of innovation: pressure on clinicians limits their ability to engage with developing knowledge, cutting-edge research, and changes to best practice. This means that while innovative technology and treatments may be being approved, they are not necessarily being used effectively. For example, while digital mental health tools such as eCBT can provide effective support while reducing the requirement for therapist time and are recommended by NICE guidance, adoption is slow in some practice areas. Additional support for clinicians to implement novel digital technologies can support adoption and implementation.

Additionally, the Kings Fund reflects that limitations to data collection processes in the community, combined with a historic focus on hospital care have led to an imbalance in data available: extensive metrics for hospital performance, but limited information on community care. The Kings Fund also reflects that a lack of investment in hardware and software has led to underdeveloped technology in primary and community health and care services.

Analogue to digital

Across the innovation system, there are examples of prioritisation of the development of digital innovation. For example, NICE priorities have supported the approval of digital technologies, enabling faster adoption of innovative tech, such as the recently NICE-approved AI technology to detect fractures. This is supported by the development of a new route for medtech developers to access NHS funding to fast-track clinically and cost-effective products for use by the healthcare system, supporting authorisation, evaluation, commissioning and adoption. The report from a recent consultation on the route developed by the NHS and NICE, with support from DHSC, OLS and MHRA is due to be published soon.

The UK medtech strategy aims to support the life sciences vision to streamline all stages of the innovation pathway. This includes providing clearer signals to industry on the innovation that patients need, reforming the regulatory framework for medical devices, expanding assessments of product categories, improving clarity over funding routes and making procurement an enabler for innovation, not a barrier.

Evaluation of the progress made one year after implementation of the strategy identified key achievements including:

- Launching the Innovative Devices Access Pathway (IDAP) pilot, bringing together regulatory, assessment and NHS partners to provide enhanced support through a sequential pathway.
- Publishing the medical technology innovation classification framework to ensure common language to describe technology.
- Innovating NICE approval processes, introducing early value and late-stage assessments to allow NICE to investigate any technology at any stage in the product lifecycle.
- Launching the £30 million Health Technology Adoption and Acceleration Fund (HTAAF) to enable integrated care systems (ICSs) to invest in medtech to support winter pressures.
- Introducing the first Medical Technology Dynamic Purchasing System (DPS) for Innovative Products for NHS Supply Chain to provide a fast-track procurement route for innovation.

NHS support for digital and healthtech innovation also represents a strength of the current system. NHS demand signalling of innovation areas of need focuses on digital platforms. In addition:

- The NHS innovation service supports the development and implementation of healthtech solutions, providing advice, guidance, and practical support for healthcare innovators. The service has supported over 700 innovations since its launch in 2022.
- The Artificial Intelligence (AI) Award is a programme managed by the NHS AI Lab, in collaboration with the Accelerated Access Collaborative (AAC) and NIHR, designed to speed up the testing and evaluation of AI technologies. These awards assist technologies at different stages of development, from initial feasibility to full evaluation within the NHS.
- The Medtech Funding Mandate from the AAC aims to guide NHS providers and commissioners toward adopting cost-effective medtech innovations that have been endorsed by NICE's diagnostics or medical technologies guidance.
- Specific funding streams are available for AI-related projects and solutions.

The National AI Strategy represents a framework to cement the UK's position as a global AI superpower. However, the strategy relies on access to people and data. While the scale of the NHS presents a uniquely comprehensive dataset, access to data requires public trust in data-sharing, and could be derailed by missteps, such as the failure of the care.data programme, and privacy concerns around the involvement of tech companies such as DeepMind and Palantir.

As an international example, Israel's use of medical data represents a successful model to adopt. Using a centralised health system ensures that 98% of the population is covered by full health insurance and has been using the same linked electronic medical record system for decades, building up a large body of data. A 2018 initiative made this anonymised dataset available to researchers, entrepreneurs, and medical institutions. As the records use a common format, AI systems can identify correlations between conditions and treatments to conduct large-scale data analysis.

Sickness to prevention

Focus on secondary and tertiary prevention in life sciences research activity enables innovation, such as using AI to supplement and improve cancer screening. This has the potential to transform the prevention, early detection and treatment of diseases, helping the NHS to provide better care and faster access to treatment. Digital advances, such as the NHS Digital Health Check also enable rapid at-home screening for several major conditions.

Personalised prevention has been much-discussed by previous governments to reduce pressures on the NHS, largely focusing on technology, health data, and genomic-based approaches. Digital technology offers a medium for personalised prevention at scale, such as through a 'prevention portal' within the NHS app, where people could access their health data, make and receive assessments of their health and personalised prevention plans, and be signposted to the services they need. However, current clinical, technical and data capability does not meet these assumptions, and further investment and building of the evidence base is required, representing a potential avenue of focus for prevention innovation. Ambitious research programmes such as Our Future Health represent opportunities to develop this understanding.

Focus on prevention is limited, however, by reductions to the public health grant, which has been effectively cut by 28% per person in real terms since 2015/16. Additionally, conducting research on primary prevention such as tax and regulation is challenging due to long timeframes, ethical and practical limits on experimental design, confounding factors, diverse contexts, and data limitations. These factors complicate isolating and measuring the impact of primary prevention interventions.

Speed up treatment

The Government's aim to ensure an NHS that is 'there when people need it' relies on reductions in waiting times across elective and emergency care. Innovative diagnostic and referral solutions can contribute to reducing delays.

Innovation in diagnostics and referral pathways, such as community diagnostic centres and AI-supported diagnostic decision-making in suspected stroke are supported by funding competitions for advancements in diagnostic solutions. For example, a £20 million fund was launched for multidisciplinary consortia to develop and evaluate integrated diagnostic solutions for early detection and diagnosis, while technologies selected for the IDAP pilot include a blood test to support diagnosis of Alzheimer's disease, and artificial intelligence to determine risk of chronic obstructive pulmonary disease.

NICE priorities also support innovation in diagnostics and referral processes, such as updated guidelines recommending ultrasounds for suspected endometriosis, alongside clearer recommendations for referral.

Increasing self-referrals for additional services also reduce pressure on primary care. This will be supported by developments in digital solutions, encouraging earlier monitoring of symptoms and self-referral. The new Pharmacy First approach reduces pressure on primary care by allowing patients to access care for seven common conditions via pharmacies rather than GP practices. This touchpoint also represents an opportunity for innovation in rapid diagnostics.

However, much of this innovation relies on the involvement of frontline staff, who may have limited capacity for the adoption of innovation and local evaluation.

Reduce mortality and morbidity across key conditions

Cancer and cardiovascular disease have historically represented priority areas in life sciences research and innovation; the conditions receive substantial funding compared to other funding areas, and the UK is making good progress in cancer compared to other clinical subjects: cancer treatments dominate NICE approvals. There is good alignment between the Government's priority conditions to tackle morbidity and mortality, OLS missions, and NICE priorities and NHS innovation areas of need. For example, musculoskeletal conditions are a priority area for NICE and are prioritised for guidance development. An early value assessment of digital platforms for community based self-management of mild to moderate osteoarthritis and joint pain was identified by the NICE-NHS England Prioritisation Subgroup as a clinical area of high priority.

However, while mental health is highlighted as an area of focus, there are no suicide prevention products in the pipeline for NICE approval. Additionally, research and innovation into morbidity is limited by the concentration of research in hospitals, compounded by the difficulty of researching primary prevention. Only 56% of GP practices took part in NIHR-supported research in 2023/24, compared to 100% of hospital trusts. This focus of research on mortality and severe morbidity limits the focus on lower acuity conditions which nonetheless contribute to lowering healthy life expectancy through their high prevalence, also impacting workforce participation. However, the development of community-based research, such as over 200 care homes participating in NIHR-supported research in 2023/24, is an encouraging trend.

Multimorbidity and life course approach

Research activity in the UK is traditionally siloed into disease conditions, reinforced by condition-specific policy goals (such as the Life Science Vision Missions), disease-specific research funding (such as disease-specific third sector charities) and a disease-specific approach to regulation taken by NICE. This means that cross-cutting research structures looking across multimorbidity or taking a life course approach are more limited. Work by the Academy of Medical Sciences highlights the increasing prevalence of multimorbidity in the UK and the need for a life-course perspective to tackle this.

Tackling inequality

Addressing health inequality is increasingly a priority for the Government, exemplified by the Government's commitment to halving the gap in healthy life expectancy (HLE) between the richest and poorest regions of the UK. This is also a priority for the NHS: the Core20PLUS5 approach aims to reduce healthcare inequalities at a national and system level by prioritising five clinical areas of focus in a target population. HLE is more sensitive to changes in self-reported health, hence achieving this goal will require a strong focus on conditions leading to lower self-reported health outcomes, and conditions affecting more deprived people. Chronic conditions and multimorbidity are key drivers of self-reported health, alongside obesity and musculoskeletal conditions. Insufficient consideration of multimorbidity, as previously discussed, will impact the ability to address health inequality.

Endnotes

1 While critical to consider for health policy, the broader social determinants of health are likely out of scope of the 10 Year Plan.

2 In our response to this research question, we describe how the system is structured in theory. In practice, how different parts of the system interact on the ground may vary; we explore these potential weaknesses of the health research system in more detail in research question 6.

About Wellcome

Wellcome supports science to solve the urgent health challenges facing everyone. We support discovery research into life, health and wellbeing, and we're taking on three worldwide health challenges: mental health, infectious disease, and climate and health.

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BIT is a global research and innovation consultancy which combines a deep understanding of human behaviour with evidence-led problem solving to improve people's lives. We work with all levels of government, nonprofits and the private sector, applying behavioural science expertise with robust evaluation and data to help clients achieve their goals.

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Nesta is the UK's innovation agency for social good. They design, test and scale solutions to society's biggest problems. Nesta's three missions are to give every child a fair start, help people live healthy lives and create a sustainable future where the economy works for both people and the planet.

For over 20 years, Nesta has worked to support, encourage and inspire innovation. They work in three roles: as an innovation partner working with frontline organisations to design and test new solutions, as a venture builder supporting new and early-stage businesses and as a system shaper creating the conditions for innovation. Harnessing the rigour of science and the creativity of design, Nesta works relentlessly to change millions of lives for the better.

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