

Research and Innovation
is everyone's business

Our Research and Innovation Strategy

2023-2026

PROUD TO MAKE A DIFFERENCE

SHEFFIELD TEACHING HOSPITALS NHS FOUNDATION TRUST



Introduction from the Chief Executive

Delivering excellent research, education and innovation is one of our key strategic aims.

The value and importance of research and innovation in delivering high quality care and better outcomes for patients is well recognised. We know that research active healthcare providers deliver better outcomes and have lower mortality rates than those that are not. We saw the vital part that research and innovation played in the clinical care of patients during the Covid-19 pandemic. During this time the Trust was very active in many of these research trials.

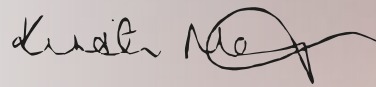
Looking to the future, through innovation and technological advances, we will diagnose, treat, cure and prevent a much wider range of disease than is currently possible. The research and development that leads to innovative new healthcare products will underpin improved patient outcomes, more efficient care and support industry and economic development.

Sheffield Teaching Hospitals (STH), from Board to Ward, is committed to enabling that vision and making research and innovation an integral and key component of our STH mission.

The six pillars of our Research and Innovation (R&I) strategy are:

- Strengthening the Trust's use of research and innovation to improve outcomes for patients and the efficient and effective delivery of care.
- Increasing international quality, impactful research and innovation activity, output and funding.
- Increasing the involvement and diversity of patients and the public in research and innovation.
- Broadening and encouraging staff participation in research and innovation.
- Using research and innovation to strengthen clinical services that are struggling to thrive.
- Enhancing research and innovation partnership working to capitalise on our relationships, enhance the reputation of Sheffield and support economic development.

We look forward to implementing our Research and Innovation Strategy which will ensure that high quality research and innovation directly benefits our patients and addresses the unmet needs of the population that we serve.



Kirsten Major
Chief Executive



Who we are

The Research and Innovation Team consists of a multi-professional group from diverse clinical backgrounds.

We work closely with many partners and organisations across the region to ensure our research has the widest impact, including:

- NIHR's HealthTech Research Centre in Long-Term Conditions, Devices for Dignity
- Health Innovation Yorkshire and Humber
- Northern Health Science Alliance
- NIHR Sheffield Biomedical Research Centre
- NIHR Sheffield Clinical Research Facility
- Sheffield Hallam University
- The University of Sheffield
- Insigneo Institute (University of Sheffield)

Research and Innovation is everyone's business.

Building on our recent achievements, our ambition is to engage staff, patients, the public and partners in our research and innovation endeavours, to ensure that STH and the population which it serves benefit from our work and realise improved outcomes and economic benefits.

We want STH to be a top choice for staff who would like to pursue research. We want to encourage all staff to see that research and innovation is an opportunity for them. We aim to create an environment where STH is research and innovation driven, with a focus on the benefits and improved outcomes that



Some of our achievements in 2022/2023.

- Active patient and public involvement and engagement across multiple areas of research and innovation including 21 Patient Participation and Innovation (PPI) panels for different clinical areas.
- Productive industry partnerships delivering new technologies for stroke treatment and new data insights informing patient outcomes.
- Renewed and expanded our National Institute for Health and Care Research (NIHR) infrastructure: NIHR Clinical Research Facility, NIHR Biomedical Research and Devices for Dignity HealthTech Research Centre (HRC) with a national role.
- Prize-winning Artificial Intelligence (AI) developments for heart disease.
- Advances in stem cell treatment for patients with multiple sclerosis.
- Toolkit to support patients who have inflammatory bowel disease.
- Partnership with the Advanced Wellbeing Research Centre to help people waiting for surgery to be active and feel prepared.

research and innovation can bring for patients, staff, and our population as a whole.

We will ensure that high quality research supports knowledge generation and practical application of solutions which directly benefit our patients and that our innovation activities address the unmet care needs that our organisation strives to deliver for the patients and public we serve. We will work across

primary and secondary care, social care, public health and the wider healthcare environment to maximise the value of research and innovation.

We will be recognised as a beacon for research translation, adopting proven healthcare innovations and partnership working, helping to drive the local and national economy, and supporting the health and life sciences industry.

Case study

The HeadUp collar – improving the quality of patients’ lives

The HeadUp Collar is a revolutionary neck support collar offering personalised support to the collection of small muscles in the neck which are particularly vulnerable to the wasting effects of motor neurone disease.

The first-of-its-kind collar was designed with and for patients at every step of the design pathway, from its initial proposal right through to its roll out within the NHS and to more than 13 countries worldwide.

By working directly with people affected by motor neurone disease (MND), researchers across Sheffield identified that currently available neck collars were not supportive or comfortable for people with MND, often being designed for other uses such as sports injuries.

The innovative collar is discreet and can be adapted throughout the day and stage of disease severity, helping ease pain and making



everyday tasks easier for people living with MND, a debilitating condition that leaves sufferers unable to move, walk, talk and breathe.

It was brought about by a five-year project led by the National Institute for Health and Care Research (NIHR) Devices for Dignity MedTech Co-operative, hosted by Sheffield Teaching Hospitals NHS Foundation Trust, working closely with the NIHR Sheffield Biomedical Research Centre and the city's universities. It involved patients and families, clinicians academics, designers, engineers and industry working together to co-develop a solution.

Following a successful trial at ten sites around the UK and Ireland, the innovative collar obtained a CE marking certificate. It is now in use in multiple NHS sites and throughout the world. The success of the HeadUp collar for MND has resulted in many other conditions which present with muscle weakness being treated with the collar.

How we will deliver

The six pillars of our strategy are described in more detail below.

Strengthening the Trust's use of research and innovation to improve outcomes for patients and the efficient and effective delivery of care.

Our focus will be on research and innovation activity addressing the needs of the organisation and our patients and service users, supporting the Government's Life Sciences Vision and meeting national and local challenges e.g., continued operational and performance improvement, management of long-term conditions, multimorbidity, demographic pressures, health inequalities and population health.

We will focus on translation of the evidence to adopt into clinical practice, focussing on tangible outcomes for patients and service users. We want to spread innovations rapidly and will engage a Board to Ward leadership commitment to embed this.



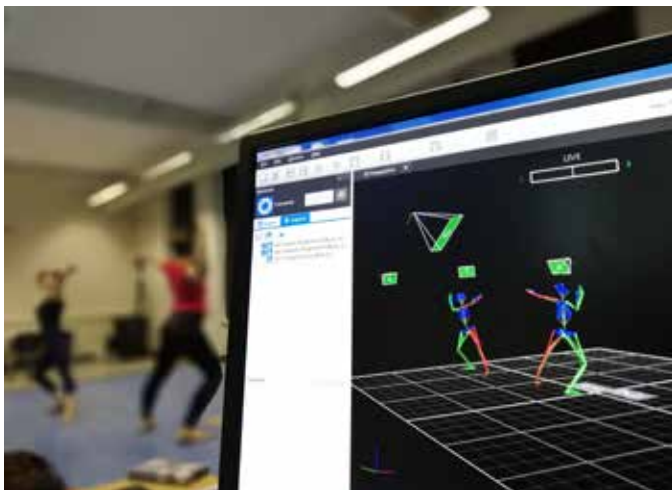
Directors, which underlines the importance of these disciplines to the Trust, in addition we will report on a refreshed set of metrics to the Board of Directors.

Increasing international quality, impactful research and innovation activity, output and funding

We already host a number of successful National Institute of Health Research (NIHR) research infrastructures and programmes. We want to strengthen further our areas of research and innovation. We also want to be more ambitious and to expand our activities to include more clinical specialties and a broader range of opportunities. We will need to prioritise based on likelihood of success.

We want to increase participation in commercial studies which generate research income, which is critical for capacity building and growth. These studies also give our patients access to the most recent advances in care and provide crucial evidence on the safety and efficacy of new interventions.

We want to increase the adoption of proven innovations into clinical practice. We also want to increase the development of innovations, and where they show promise, ensure they are properly evaluated and adopted into practice. We will connect our innovation activities and support across the Trust to enable this.



We will adopt and apply digital innovations such as artificial intelligence (AI), remote monitoring and clinical decision support tools to improve patient outcomes and support new clinical models.

Innovations in genomics are rapidly advancing. We will ensure these are embedded for the benefit of our population.

We will establish a Research and Innovation Board Committee to provide assurance to the Board of

Case study

Using artificial intelligence to transform future healthcare

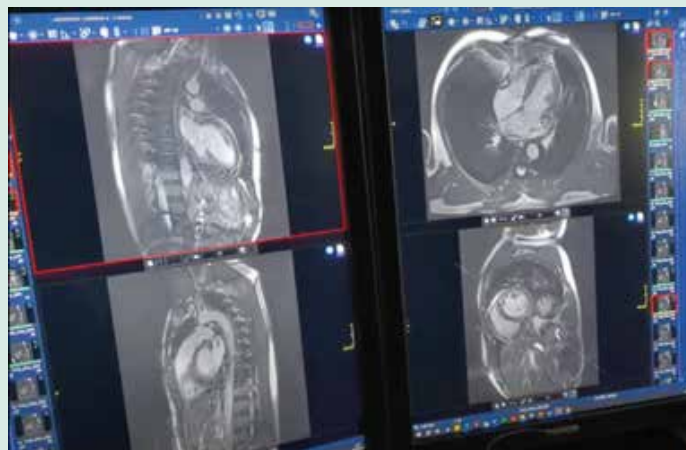
Our Trust are playing a leading role in using artificial intelligence (AI) for patient benefit, developing an AI cardiac diagnostic tool that can carry out complicated measurements of the heart in a few seconds.

The software, called the 'AI segmentation of cardiac MRI to automate the measurement of cardiac function and volume technology', provides a super-fast analysis of the heart's function and could be a game-changer in future cardiovascular care, speeding up diagnosis and giving greater insights into the inner workings of the heart.

Patients with heart problems usually undergo MRI scans to determine how enlarged the chambers of the organ are – a sign that it is under strain – and whether they will need invasive surgery or can be treated with medication.

The MRI scan captures about ten different images of the heart, each from a slightly different angle, to create a full picture. Doctors then have to print out these scans and painstakingly measure the size of the chambers by physically drawing on them.

Most hospitals carry out up to 20 of these lengthy assessments a day, and as the analysis of each one takes about 20 minutes it can eat up a significant proportion of a cardiologist's time.



The new AI software can accurately do the job in under 60 seconds. The tool has been tested on thousands of images and validated in over 5,000 anonymised patient scans, with further testing taking place on scans from more than 30 hospitals in the UK over three years.

The technology has been shown to be particularly useful for the diagnosis of pulmonary hypertension, a serious condition which if left untreated can be fatal.

Another innovative AI tool, which has been in use at our 3D lab, has been shown to accurately measure kidney size six times faster than human expert analysts. The software provides an accurate and rapid analysis of total kidney volume, a measurement used to assess future kidney lifespan in patients with autosomal dominant polycystic kidney disease. By automating the segmentation of the MRI scans, the AI has the results available in less than a minute. These would usually take approximately an hour, per patient case, of staff time. The technology could be used in kidney clinics throughout the world.



Increasing the involvement and diversity of patients and the public in research and innovation

We want it to be easy for everyone who wants to be involved in research and innovation to do so, whether staff, patients or service users and across all disciplines.

We will extend our patient and public involvement activity to ensure that our research and innovation are relevant to the population we serve. We will address equality, diversity and inclusivity, involving seldom heard groups to reduce health inequalities. We will further develop our links with community groups representing diverse populations to increase research participation. We will involve patient and service users at all stages, using user centred co-production techniques, the voice of Sheffield patients and service users and user-centred design principles to guide our focus.

Broadening and encouraging staff participation in research and innovation

We want to build on and develop our great pool of talent and to be the place where staff choose to work to carry out research and innovation, across all disciplines.

We want to attract staff who have never participated in research and innovation to

become involved, and to support them to acquire the skills to make it happen. We will be inclusive of all professions and disciplines at all levels. We will provide the opportunity for mentorship and leadership development to create new leaders in research and innovation, championing entrepreneurship. We will influence organisational culture to drive rapid adoption of innovations. We will grow STH's Data Science and Artificial Intelligence capability to ensure the Trust benefits from the power of healthcare data and will support realisation of the research and innovation benefits of the Trust's new electronic patient record (EPR).

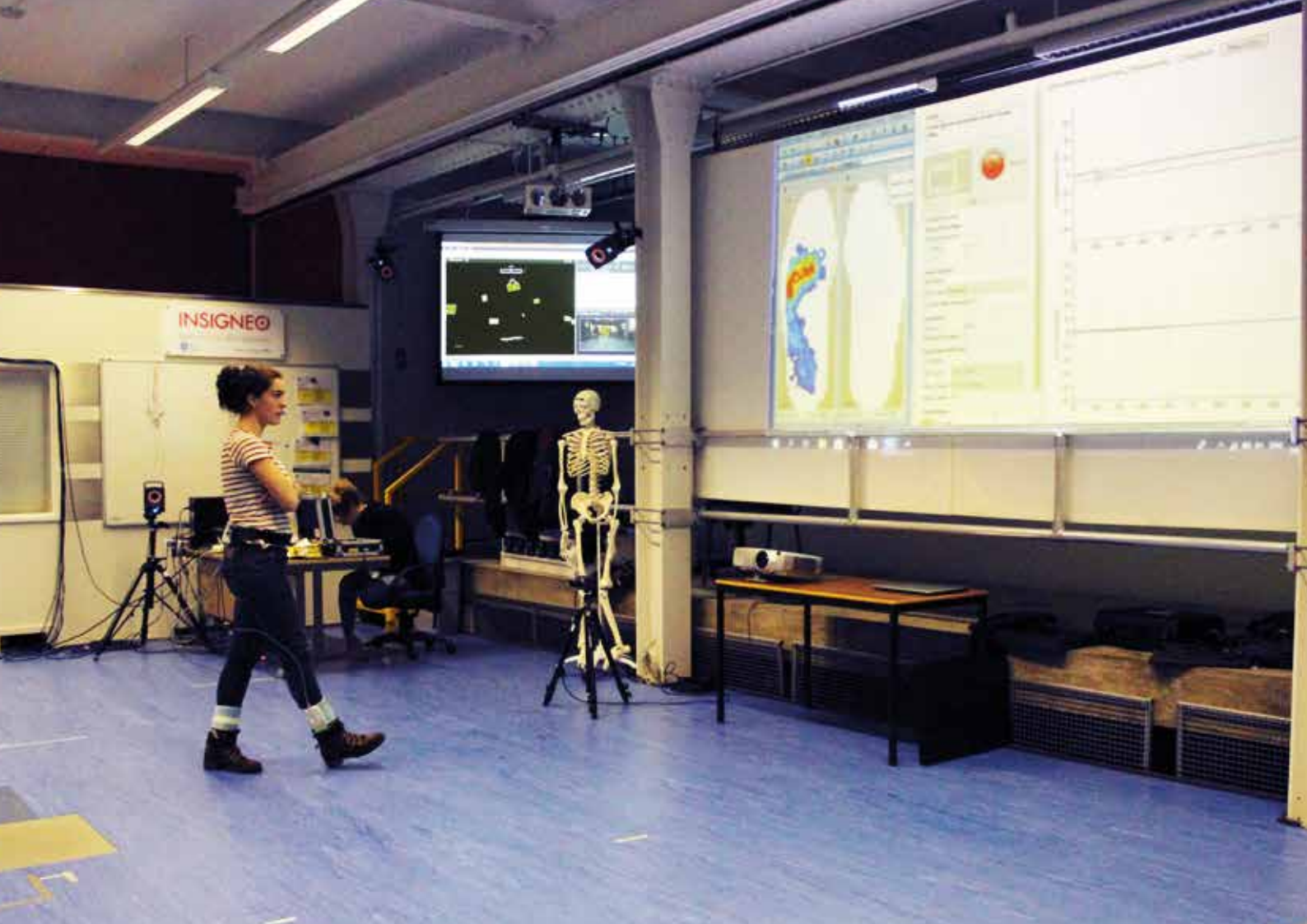
Using research and innovation to strengthen clinical services that are struggling to thrive.

Research and innovation are key tools to build strong clinical services. We will support services where research and innovation need to be strengthened as part of attracting and retaining the staff we need. We will do this with other NHS Trusts, universities and other research and innovation networks and partnerships to develop research capability, activity and funding. We will be proactive in responding to innovation opportunities where this can be a lever to strengthen services.

Enhancing research and innovation partnership working to capitalise on our relationships, enhance the reputation of Sheffield and support economic development.

We will broaden our networks and reach and develop a stronger and broader range of partnerships.

We will strengthen our work with our strategic partners in the two Sheffield universities and Yorkshire and Humber Local Clinical Research network, aligning work to deliver key targets. These include aligning our strategy with those emerging from our two universities, including the University of Sheffield's cancer research strategy, and completing



joint work, to undertake sponsorship and research governance of clinical and social care research culminating in the formation of a joint research and innovation office. We will leverage the expertise and skills of Medipex Healthcare Innovation Hub, Health Innovation Yorkshire and Humber, the innovation hub of the South Yorkshire and Bassetlaw Integrated Care System (ICS) and the Northern Health Science Alliance (NHSA) to deliver our key aims.

Strengthening our partnerships, prioritising those with the greatest potential to support achievement of our research and innovation objectives is our aim building on the learning from Academic Health Science Centres.

We will develop relationships with Trusts in the South Yorkshire and Bassetlaw Acute Federation, and other leading trusts in Yorkshire and Humber and across the country to progress joint projects as well as new industry relationships.

We will support and enable cross-sector and cross-organisational working, with charities, primary care, social care, mental health organisations, public health, and local authorities, as appropriate to deliver on our ambition.

We will participate in industry-led innovation and support local healthcare small and medium sized enterprises in health technology development to help build a thriving local economy.

Our approach will be aligned with national and other policies around economic growth: Life Sciences Industrial Strategy, Life Sciences Vision, Government Research and Development Roadmap, Commercial clinical trials in the UK: the Lord O'Shaughnessy review and the Shelford Group Strategy.



How we will ensure that our strategy translates into action?

We have identified a comprehensive scheme of enabling actions in the following themes which will be key areas within a detailed implementation plan. The plan will include key milestones with the aim of:

- Raising awareness - increasing visibility of research and innovation collaborations, successes and achievements and supporting Directorates to accomplish their research and innovation expectations.
- Staff engagement - drawing staff into research and innovation activities, showcasing research and innovation opportunities and supporting staff in professional development, ensuring diversity of opportunity.
- Develop and grow research pioneers – identify aspiring researchers and research active directorates and develop prioritised plans to make them leaders for the future including mentorship from more senior research investigators within the organisation.
- Improving systems and processes - focussing on robust governance and compliance with regulation, setting stretch internal targets with benchmarking, developing processes for rapid initiation of clinical trials. We will focus particularly on commercial studies ensuring that collaboration with STH is both rapid and successful. This will require that key support for commercial clinical trials, particularly pharmacy and imaging is well planned and available despite other pressures.
- Measuring Success - developing key performance indicators for process and outcome, including impact and income generation, staff and patient benefit and sharing these across the organisation and beyond.
- Marketing STH - building a marketing and communication plan to promote STH's research and innovation capabilities to partners, including academic, industry, locality and enterprise-based partners to capitalise on opportunities and grow the local economy.
- Data and management - develop capacity and capability in data management, governance and infrastructure, ensuring the new electronic patient record supports research and innovation.
- World-class facilities and infrastructure - provide organisational support to maximise the local and national value of our NIHR infrastructure, support adoption of advanced therapy medicinal products, ensuring our research and innovation activities and structures are integrated, ensuring the value of our research active groups and partnerships is realised.

These enabling actions will underpin our strategy and form an Operational Plan. We will develop a suite of Research and Innovation Key Performance Indicators (KPIs) that encompass process and outcome measures by which we will measure our success. These will include the number of successful grant applications, peer-review publications and research income but we will also include KPIs which will emerge from the developing NIHR Outcomes Framework. These may include the amount of funding being raised from Commercial Research Income, the number of active researchers in disciplines other than medicine and dentistry

and the number of research projects tackling NHS priorities such as those addressing 'Compound Pressures'.

We will ensure that our strategy and operational plan is incorporated into broader Trust strategy and that directorates will have a Research and Innovation dimension to their performance objectives, thus ensuring that research and innovation becomes part of how STH delivers all services for the benefits of our patients, their families and carers.

Case study

Pioneering trial hopes to improve survival rates for bladder cancer

We are leading a major new trial which could transform outcomes for patients with bladder cancer by matching treatments to DNA and genetic changes found within cancerous tumours.

The first-of-its-kind trial, known as GUSTO, will seek to establish if treatments for muscle-invasive bladder cancer, one of the most common cancers, can be tailored to different genetic subtypes known to cause the disease.

Currently, advanced bladder cancer is treated using a 'one-size fits all approach' involving chemotherapy, surgery and other treatments such as radiotherapy.

But scientists now believe they can predict which treatment is best suited for patients depending on the genetic traits of the cancer itself. This means some patients may respond best to chemotherapy, others to immunotherapy as a treatment alone or as a boost to chemotherapy.



Finally, some patients may not respond to either chemotherapy or immunotherapy and so may need immediate surgery.

The trial is being jointly funded by a Medical Research Council (MRC) and National Institute for Health and Care Research (NIHR) partnership and is running across 20 NHS sites.

In the trial about 160 patients will receive treatment tailored to the DNA of their cancer whilst the other half will receive conventional treatments. Researchers hope the study will fundamentally change the way advanced bladder cancer is treated, boost quality of life and survival rates for the disease, which have remained unchanged for three decades.



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