

Item 3.3.1a

Research and Innovation Strategy: 2020 to 2023

“Becoming an R&I leader”

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1. Executive Summary

Research and Innovation continues to be an important part of the overall Trust strategy. It is therefore important to have a clear and ambitious Research and Innovation strategy for the next three years.

This document brings together the historical and current position of Liverpool Heart and Chest Hospital within the research and innovation landscape. It sets the position of the Trust in the city, the region and nationally. In describing the successes and the weaknesses we aim to outline a plan that will enable all forms of research and innovation to flourish in a safe and efficient manner which are the foundation stone for the next three years.

The main vision is to lead all aspects of cardiothoracic research in our health system, aligned to our Trust vision of being the best. This leadership role will be supported by significant growth and expansion of our areas of research, focusing on what we do particularly well, delivering the translational move from bench to bedside, bringing new knowledge and innovations to the clinical frontline, with a clear patient centred approach.

We have identified the main strategic objectives for this vision, with an emphasis on developing capability at the Trust, growing the next generation of researchers and encouraging new areas of research.

The deliverability of this strategy will be based on:

- strong governance processes: modernising our systems and working fully embedded in the Liverpool research system
- supporting our workforce through organisational change and continuous development
- engagement with our partners, commercial and non-commercial, to be the site of choice

We believe this strategy will align well to the overall LHCH strategy for Patients, Partnerships and Populations.

2. Introduction

Liverpool Heart & Chest Hospital NHS Foundation Trust (LHCH) Research & Innovation (R&I) Strategy is a three-year plan that outlines the key priorities for research and innovation within the Trust until 2022/23.

The strategy is one of the supporting strategies for the new LHCH Strategy: “Patients, Partnerships and Populations”.

3. Background

Research aims to generate new knowledge through a systematic and rigorous process to answer a given question. Innovation refers to the implementation of this new knowledge and its application at a local level in order to assess its effectiveness.

There is a wealth of evidence regarding the benefits of participation in research by patients and the public; the Royal College of Physicians report “Benefiting from the Research effect” published in

November 2019 sets out the vital role of research in the NHS, and reminds us that research is a key part of the NHS Constitution¹.

4. Research & Innovation in the UK

The UK is well known internationally for its excellence in research and innovation; UK universities are considered to be amongst the top in the world. The established links between Academia and the NHS have resulted in a prolific number of Nobel Prize winners. It is not surprising that the pharmaceutical and medical devices industries have made a clear decision to set up base in the UK, looking mainly at the prospect of working with the NHS and Universities. Additionally, the publication of the NHS Long Term plan in 2019 further reinforced the message that research and innovation are important for the sustainability and success of the future NHS.

A close look at the landscape will tell us the immense contribution of research in patient care and the benefits to the NHS. Every £1 invested in medical research delivers a return of 25p every year.² Individual organisations also benefit from participating in research; it has been estimated that every patient participating in an industry sponsored clinical trial brings an average of £9,189 in revenue from life sciences companies plus the pharmaceutical cost saving between £4,143 and £7,483.³

Additionally, and even more important, there is significant evidence of the impact of participating in research on good clinical outcomes.⁴

In a recent publication by the Academy of Medical Sciences the main message is clear: the need to enhance the NHS-Academia interface to better harness the research expertise and capability of the NHS for the health and wealth of the nation.⁵ As such the national and regional research landscape appears as follows:

National

1. **National Institute for Health Research (NIHR).** The Department of Health and Social Care created the NIHR with the mission to improve the health and wealth of the nation through research. It is directed by leaders from DHSC and directors of the coordinating centres. The NIHR delivers its activities through the seven coordinating centres located across the UK; they are set up to commission and fund research, provide research capability and infrastructure, and support researchers and people participating in research.⁶
2. **Academic Health Science Centres (AHSCs).** These have been set up in 2014, as partnerships between NHS and universities. There are six designated AHSCs: UCL Partners, Cambridge University Health Partners, Imperial College AHSC, King's Health Partners, Health Innovation Manchester, and Oxford AHSC. They have been set up to bring together world-leading

¹ *Benefiting from the "research effect". The case for trusts supporting clinicians to become more research active and innovative.* Royal College of Physicians, November 2019.

² Grant J & Buxton MJ (2018). *Economic returns to medical research funding.* BMJ Open 8, e022131.

³ KPMG (2019). *Impact and value of the NIHR Clinical Research Network.* https://www.nihr.ac.uk/documents/partners-and-industry/NIHR_Impact_and_Value_report_ACCESSIBLE_VERSION.pdf

⁴ Jonker L & Fisher SJ (2018). *The correlation between National Health Service trusts' clinical trial activity and both mortality rates and care quality commission ratings: a retrospective cross-sectional study.* Public Health 187, 1-6

⁵ *Transforming health through innovation: Integrating the NHS and academia.* January 2020. The Academy of Medical Sciences. <https://acmedsci.ac.uk/file-download/23932583>

⁶ NIHR. Our Governance. <https://www.nihr.ac.uk/about-us/our-governance/>

academic and clinical research centres, NHS organisations and others to harness research and innovation for better patient care and a healthier population.⁷

3. **UK Research and Innovation.** This is an arm of the UK Government with a role in ensuring the UK is able to meet the societal and industrial challenges that the UK faces locally and internationally. With this in mind, the Government has committed an additional £7 billion by 2021/22 and set up a target to increase expenditure on R&D to 2.4% of GDP by 2027.⁸
4. **Academic Health Science Networks (AHSNs).** There are 15 AHSNs across England, established by NHSE in 2013 to spread innovation at pace and scale; improving health and generating economic growth. They were relicensed again in 2018. Each AHSN works across a distinct geography serving a different population in each region. They connect NHS, Academia, local authorities, third sector and industry and act as catalysts creating the right conditions to facilitate change across whole health and social care economies, with a clear focus on improving outcomes for patients.⁹

The rise of the COVID19 pandemic has had a significant impact on Research across the world; never so many new research findings have been published in so little time. The DoH&SC through the NIHR first put a halt to all research activities when the pandemic lockdown came into effect; however, there was a shift to take on COVID19 research seen as priority from the Public Health point of view. A series of Urgent Public Health studies were pushed to all research active trusts across the UK. Research linked to COVID19 has become a new theme prioritised at all sites.

Regional

1. Northern Health Science Alliance (NHSA). A Membership organisation with a board and council representing leaders from the North's top research universities, research intensive teaching hospitals and AHSNs. It represents 12 localities: Durham, Humberside, Lancaster, Leeds, Liverpool, Manchester, Newcastle, Preston, Rotherham and Doncaster, Sheffield, Teeside and York. The NHSA works with its clinical and academic members to help structure more collaborative approaches to bidding for research funding. The NHSA works to promote the North's health sciences through an array of promotional activity. Its vision is to end Northern inequality through health research and innovation, by establishing the North of England as an internationally recognised health research system.¹⁰

2. Clinical Research Network North West Coast (CRNNWC). This is the NIHR local network providing the infrastructure that allows high-quality research to take place in the NHS in the North West Coast region; their aim is to increase the opportunities for patients to take part in clinical research and ensure that studies are carried out efficiently. They have been operational since 2014 and covers South Cumbria, Lancashire, Merseyside and Cheshire. The NWCCRN supports the delivery of research in a number of priority areas: cardiovascular

⁷ UCL Partners. What we do. <https://uclpartners.com/what-we-do/>

⁸ UKRI. Strategic Prospectus: Building the UKRI strategy. May 2018. <https://www.ukri.org/files/about/ukri-strategy-document-pdf/?pdf=Strategic-Prospectus>

⁹ About Academic Health Science Networks. <https://www.ahsnnetwork.com/about-academic-health-science-networks>

¹⁰ The NHSA. Representing world-class health and life sciences across the North of England. <https://www.thenhsa.co.uk/>

disease, cancer, critical care, respiratory disorders, stroke and surgery, are among those.¹¹ The NWCCRN is the major funder for LHCH's research infrastructure.

3. The Innovation Agency (IA). This is our regional AHSN, with a geographical coverage aligned to the North West Coast (the same as the NWCCRN). They have been working with LHCH since their first launch, and have brought to us a number of innovative solutions and national innovations, such as Heartflow, AF Screening, etc. LHCH are the legal hosts for IA since April 2020.

4. Liverpool Health Partners (LHP). It is the academic health science system for Cheshire and Merseyside. It brings 13 organisations working together to develop world-leading research. The mission is to unify the clinical and academic strengths of Cheshire and Merseyside to improve population health outcomes and economic productivity. Their vision is that by 2021/22 they will have transformed the strategic landscape for research, education and service in Cheshire and Merseyside. They will do this focusing on three strategic areas of population need: Liverpool Centre for Alcohol Research, Liverpool Centre for Cardiovascular Science, and the Liverpool Head and Neck centre. LHCH is the legal host of LHP since February 2020.¹²

5. NIHR Applied Research Collaboration North West Coast (ARC NWC). It consists of health and social care providers, NHS commissioners, local authorities, universities, public advisers, and the Innovation Agency, working together to learn more about health inequalities, and overcome barriers around translating discoveries in health research into practice, improving lives. They have three main themes: "care and health informatics", "methodological innovation development, adaptation and support", and "health and care across the life course".¹³ They are funded by NIHR. LHCH participates in this collaborative.

Current LHCH Collaborations It is obvious from the above sections that the number of collaborations and associations for LHCH is significant, even if only from the governance point of view. It is clear that each of these organisations will play a different role, albeit, in some cases there is potential for duplication of efforts. Based on what we have shared so far, the main partners for LHCH research and innovation are:

- **CRNNWC**- as our main funder of research infrastructure. Also, our CEO, Jane Tomkinson is the current Chair of the Partnership Group, providing insight for LHCH.
- **University of Liverpool** – our main academic partner; a number of our consultants have honorary contracts with the University linked to their significant research activity. This link will continue to grow as LHCH achieves University Trust status. The new University Department of Cardiovascular and Metabolic Medicine based in the Institute of Life Course and Medical Sciences will be a focus for major new investment in cardiovascular research in collaboration with LHCH through links to the Institute Dean Professor Pete Clegg. The Liverpool Centre for Cardiovascular Science (LCCS) is led by Professor Greg Lip, as Director for the Centre and link between the two organisations.
- **Liverpool John Moores University** – another academic partner; key focus on exercise physiology and health statistics. A number of our researchers have joint projects with members of LJMU. They are also a founding partner of LCCS.

¹¹ Clinical Research Network North West Coast. NIHR. <https://local.nihr.ac.uk/lcrn/north-west-coast/documents/CRN%20NWC%20-%20About%20us%20-%20full%20promotional%20pack.pdf>

¹² Liverpool Health Partners: About Us. <https://liverpoolhealthpartners.org.uk/about-us/>

¹³ <https://arc-nwc.nihr.ac.uk/about/info-on-arc-nwc/>

- **Liverpool Health Partners** – LHCH has been part of LHP since its inception. As new hosts for the organisation, we have a closer relationship with them. LHP are the glue that brings together the research community across Merseyside; the creation of the joint research service, also known as SPARK, is very important to LHCH. This brings welcome changes to the governance process for research across the locality. Members of our staff have been seconded to LHP to be active members of the joint office. We would expect to see a positive effect of this venture on the number of commercial trials coming to the city. Additionally, during the COVID19 crisis, LHP has had an essential role coordinating all COVID19 related research activity across Liverpool, through a Gold Command structure.
- **Edge Hill University** – our third academic partner. Mainly linked to the development of their new Medical School and our role in that. Also, a new partner of LHP, and very keen on promoting higher degrees and research among the nursing and allied health professions. This is particularly relevant to LHCH plans.
- **Innovation Agency** – a major partner for LHCH in the world of innovation. As mentioned before, we are their hosts since April 2020. Again, as for LHP, we expect to see some positive influences from this hosting role, specially linked to identification of opportunities and access to innovation funding.
- **Applied Research Collaborative** – LHCH is one of the NHS organisations aligned to the work of this collaborative. Particularly relevant linked to the health needs of the population, and the use of our existing clinical data to inform the work.
- **Liverpool City Region (LCR)** – this is the Combined Authority for the six local authorities: Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral.¹⁴ There is a major focus on creating an environment where the local economy will thrive. This is underpinned by having excellent digital connectivity and systems, and policies that can support an excellent digital environment. The LCR plays a major role with the Innovation Agency on developing the infrastructure required to maximise innovation in the city region. The Civic Data Co-operative led by Prof Buchan brings together anonymised health and social care data, to help understand the key determinants of health in the region¹⁵.
- **AIMES** – commercial data centre which has spun out of the University of Liverpool. They are a service provider for the hosting, backup and business continuity of data systems.¹⁶ They are important partners as a research trusted environment.
- **Cheshire & Merseyside Health and Care Partnership** – the regional vehicle for delivery of the “Five Year Forward View” and the “NHS Long Term Plan” is a major partner for innovation, in particular linked to cardiovascular and respiratory work.
- **Royal Brompton and Harefield Hospitals** – in 2011, the Trust formed the Institute of Cardiovascular Medicine and Science (ICMS), in partnership with the Royal Brompton and Harefield Hospitals and Imperial College London as academic partner. Over the last 9 years, we have seen a number of close collaborations between the two trusts. This continues as the joint work benefits from the collaboration. Some changes are a foot however, as Imperial College are not any longer the academic partner for the RB&HH and the LHCH main academic partner is the University of Liverpool.

¹⁴ <https://www.liverpoolcityregion-ca.gov.uk/who-we-are/>

¹⁵ <https://liverpoolhealthpartners.org.uk/research-programmes/digital-and-health-informatics-ageing-well/>

¹⁶ <https://www.imes.uk/home>

5. What has already been achieved

The 2018-2021 Research & Innovation strategy was approved by the Board of Directors in July 2018. The strategy was focused around our offer to our patients and the promotion of research and innovation. The objectives of the strategy were:

1. Develop and enhance new strategic initiatives and relationships
2. Continue promotion of research and innovation in our existing priority areas
3. Build a culture that promotes, supports and values research and innovation activity within the trust
4. Develop capacity and capability for research and innovation within the trust
5. Maximise opportunities for our patients to take part in research
6. Maximise opportunities for research and innovation collaborations with external partners
7. Identify and implement new innovations likely to benefit the trust
8. Performance and governance

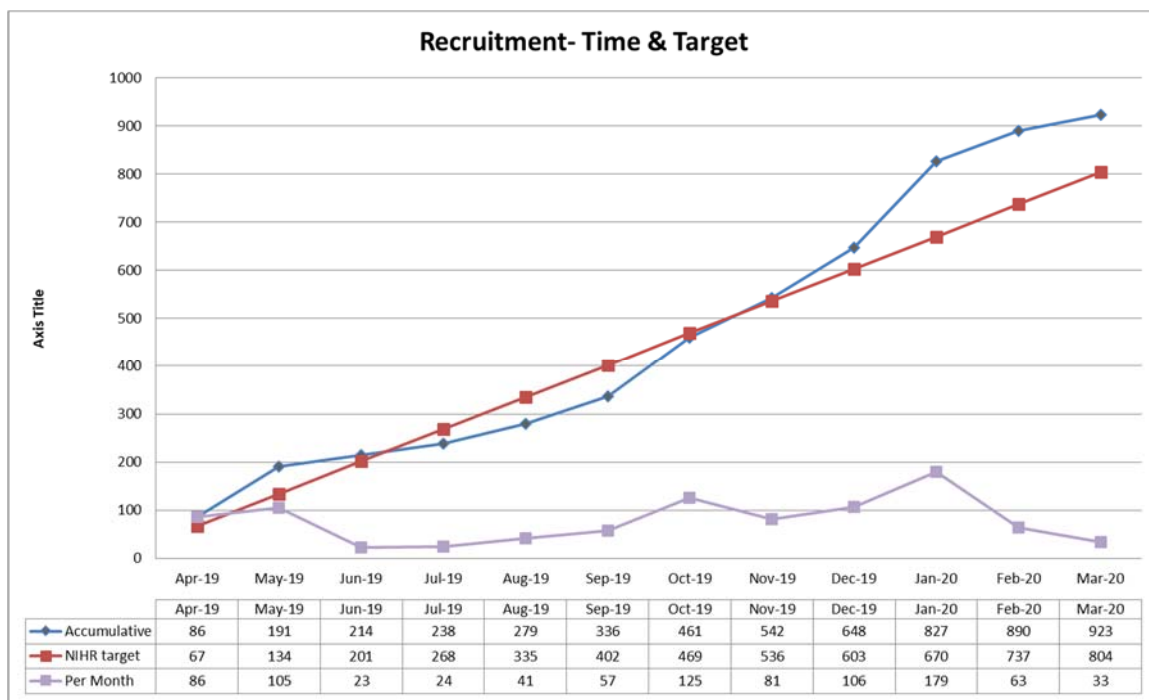
Based upon its implementation, and despite the difficulties arising from extended leave in the R&I leadership team, and the negative impact on the support staff in the Research department, much has been achieved:

1. Strong links with Academia have developed:
 - Appointment of Prof Gregory Lip in February 2019 as lead for Cardiovascular Research at the University of Liverpool. This has resulted in a flurry of new academic activity in cardiovascular research. Prof Lip has brought some of his team from Birmingham bringing new expertise in areas such as qualitative research and clinical psychological research.
 - New honorary appointments for our researchers: Prof Gupta, Prof Stables, Prof Wright, Assoc Prof Field, and Senior Clinical Lecturer for Dr Appleby, Dr Greenwood and Mr Shackcloth.
 - Creation of the Liverpool Centre for Cardiovascular Science. One of the centres of excellence of the University of Liverpool, and a joint venture between LHCH, University of Liverpool, Liverpool John Moores University and Liverpool Health Partners. This is led by Prof Lip and continues to develop and grow.
 - Edge Hill University new Medical School.
2. Clinical trial capability has progressed. Our ability to conduct both internal and external trials has been the foundation of a number of notable successes:
 - The impact of HEAT-PPCI as biggest single centre randomised study which changed international guidelines
 - Series of AF studies reflected in international guidelines
 - Played a major role in the UK Lung Cancer Screening trial, which has influenced the implementation of the Healthy Lung Project nationally
 - Global first for recruitment to international CF trial
 - Highest national recruiting site for NECTAR HF, ARTESIA, VISION AF and the TAVI trial
 - Recruitment of over 10% of patients to VIOLET trial, one of the largest ever randomised trials in thoracic surgery
3. A new ideology for internal trials has emerged. Following the success of HEAT PPCI a number of vital lessons have been learned in relation to trial conduct, governance and overall efficiency. The emergence of comparative effectiveness methodology has been adopted within the ICE-CAP unit (Improving Clinical Effectiveness by the Continuous Assessment of

Practice). Prof Rod Stables has developed this unit within the Research department to facilitate the evaluation of applied clinical practice; the unit integrates routine practice with quality research to demonstrate value and effectiveness. Several new and innovative facilities are now available to and being used by other researchers:

- a. Red Cap electronic CRF and web randomisation
 - b. Electronic Trial Management System (eTMS) developed in conjunction with AIMES to guarantee a high quality file repository and trial governance
 - c. Utilisation of EPR data to automatically populate an eCRF – saving research nurse and fellow time
 - d. Linkage to Hospital Episode Services (HES) for long term outcomes
 - e. SHAREPOINT as a single repository accessible to researchers for the management of clinical trials.
4. ICMS has continued to develop with a new focus on effectiveness and robust data analysis. Major successes from ICMS are:
- The development of the Aortic Tariff
 - Guidance for development and implementation of the Adult Congenital Heart Disease service
 - The introduction by Dr Wright of a new Cardio-Oncology service at LHCH following initial research collaboration and cross-fertilisation
 - The REM-HF study and its impact on national practice
5. Developing our capacity:
- Two of our new consultants, Dr Tim Fairbairn and Dr Saagar Mahida, have been successful in being awarded the NIHR Scholar programme. This was set up by NIHR to develop the chief investigators of tomorrow.
 - NIHR Research Nurse Programme: some of our research nurses have been given the opportunity to further develop their research skills by participating in this programme. This is an excellent opportunity for our team to network and learn from others, and share best practice.
 - Higher degrees: some of our staff have completed their PhDs, whilst having full time positions at the Trust; Dr Matthew Shaw, Dr Ruth Ashton, Dr Claire Brough and Dr Emma Rickards have all been awarded in the last 12 months.
6. Patient and Public Involvement: LHCH has been a pioneer nationally in this aspect of clinical research. We have been the first trust in the UK to have a Patient Ambassador as part of the Research workforce. This has been supported from external donations from the Lord Leverhulme Charitable Trust. This role has been pivotal for the development of new studies that are relevant to the needs of our patients and the populations we serve, but also, to keep the focus on the patient centred aspect of research. Our Research Patient Ambassador, Keith Wilson has developed the role from its birth to what it is now, a national role working with the NIHR, Care Quality Commission, NHS England, NHE Genomics England, and obviously at local level working with LHP, CRNWC, the University of Liverpool, LCCS, etc.
7. Development of non-medical research: we have continued to facilitate research for non-medical disciplines to promote research and innovation across the Trust. The examples given above of PhDs are all non-medical staff. Additionally, we are supporting the perfusion team to develop their own research projects and provide them with peer review through the R&I committee.

8. Innovation: in-house ideas and product development, as well as adapting solutions from other places / organisations. We have seen the development of:
- Pressure Ulcer prevention tool from Julie Tyrer, Nurse Consultant in Tissue Viability
 - New process for the identification and prevention of moisture damage: MINIMISE
 - CareCube, developed in partnership to provide a tool for scheduling in the cath lab.
 - RITMOCORE, EU funded grant for the development and implementation of an innovative procurement model for remote monitoring services for Heart Failure patients. RITMOCORE is the first EU initiative under Horizon 2020 which has successfully developed a process for international tender of services. LHCH is the only UK site participating in this major EU grant.
 - Delivery of cardiothoracic robotic surgery, providing our patients with faster recovery times, and shorter length of stay.
 - Creation of new roles to cover the clinical needs of our population, such as Physician Associates supporting the respiratory service in the community.
 - HeartFlow is a non-invasive technology for the diagnosis of coronary cardiac disease vessel by vessel, determining the narrowing of the artery and the impact that the narrowing has on the flow. This was brought to the Trust as part of the Innovation Tariff supported by NHS England. The Trust has been one of the major sites in the UK to deploy the technology, benefitting our patients.
9. Performance and governance. Research activity is measured by the NIHR through their High Level Objectives; monthly the Trust submits data linked to open studies, activation time, recruitment time to first patient and total number of patients participating in research studies. Although the year started with low recruitment figures, we have seen a significant improvement in the trend that is taking the Trust above the planned recruitment target. To note the impact of the COVID19 pandemic on overall research activity during the last quarter in 2020; all research activity was on hold with the exception of COVID19 Urgent Public Health studies as mandated by the NIHR.



10. Promotion of research and innovation. There is no better way to showcase the outcomes of research than sharing the quality of our research outputs. A search for publications with affiliation to LHCH from 2008 to date, has identified a total of 1502 peer-reviewed publications; 20 of them are identified as highly cited publications falling within the 1% of most cited articles. These data provide clear evidence for the internationally outstanding nature of recent research involving LHCH particularly focused around clinical trials activity.

* Publications 2008-2019	Number of LHCH publications	1502
	Sum of the Times Cited	12829
	Average Citations per Item	8.54
	h-index	51

11. Commissioning by evaluation: LHCH has played a major part on producing quality research data that has informed the implementation of new commissioned services such as Transcatheter Aortic Valve Implantation (TAVI) and Left Atrial Appendage Occlusion (LAAO).

6. Our resources.

The development of the new strategy has taken into account the current baseline level of resources available for the delivery. They can be classified in three distinct types:

- a. **Workforce.** The Research Department has been running on a staffing model which had not been changed over the last 6 years. It has delivered successfully but more recently has been the cause of much discontent and inefficiencies. Conversations with members of staff and the results of the Staff Survey have been the trigger for a remodelling of the organisational structure of the department and a review of all existing positions in the light of the future needs. This has resulted in an investment in three new band 7 posts, two of them senior research nurses and the third one administrative, with greater emphasis in innovation. The new structure of the department can be seen in Appendix 1. This structure gives career progression to the research staff and is built around their own development. To note is the higher profile given in the new structure to the Research Patient Ambassador reflective of the importance of the role and the positive impact that continues to have. The culture around the processes and systems needs to be addressed to align properly to the joint research service through LHP SPARK office, and also updating old systems and processes that have been in place for too long. It is a change in mind sets and in working practices to bring the Unit fully to the 21st Century. An important aspect is the need to develop new chief investigators. The trust has grown its research portfolio based on a small number of consultants that have a major involvement in research; many of them with little time allocated for their research activities as part of their job plans. It is imperative that we develop a system that is fully supportive of research time in job plans to encourage the new generation of consultants to take on the role of chief investigators, and hence grow our next cohort of researchers. A set of performance indicators needs to be aligned to this as part of the appraisal process. The participation of our young consultants in the Research Scholars Programme by the CRNNWC is supportive of new principal and chief investigator training. Something to also be mindful of is the impact of COVID19 and the redeployment of our research team to other areas of the Trust, in particular nurses to Critical Care. This is likely to be required to happen again should a second wave happen. We need to be clear about the impact that this will have in the Trust research output.

- b. **Finances.** R&I is a mainly self-funding department in the Trust; only the Clinical Audit team and the Head of R&I are supported by the Trust budget. The rest of the members of staff are all supported from external funding sources: CRN NWC, clinical trials income, and specific grants. It is therefore of paramount importance that R&I continue to develop commercial links, as it is income from these partnerships that allows research to invest and grow.

The table below shows the financial position over the last three years.

Over the last three years the Research finances have gone from position of steady growth where reserves were growing and supporting new local research activity, to where we are now, seeing our reserves being used to cover our running costs. It is an unsuitable situation and hence a major concern.

Clinical trials and R&D income.

Income (£000s)	2017/18	2018/19	2019/20
Clinical Trials	1,152	1,378	1,187
R&D	438	436	427
Total	1,590	1,814	1,614
Reserves (£000s)	1,306	1,430	983
R&D acc.	505	466	299
Investigators acc.	801	964	684

- c. **Facilities.** The R&D department has been based in the Research Unit since 2012, sharing the space with the Informatics team. It should be noticed that the development and refurbishment of the Unit was mainly funded from Research charitable donations and reserves, with the Trust making a small contribution to the main cost. Historically, the Unit housed also the Informatics team, who were under the same Director at the time of the build. When the department first moved to this facility, it was appropriate and it offered good future proofing prospects. However, as the informatics team has grown and expanded, the space limitation has become a real issue for R&I workforce, with limited meeting facilities, mainly being used by other departments and little room to accommodate any new research staff.

The Liverpool Centre for Cardiovascular Science has been given a physical location based at the existing research lab; this has resulted in two clinical rooms for research studies, two laboratories and office space for the Director of the LCCS and the small lab team. However, Professor Lip's plans for expansion of the LCCS research team based at LHCH, are negatively impacted by the limited space available. Anecdotally, we have seen the eleven PhD students supervised by Prof Lip all in one small office as no other space is available; clearly not supportive of the international ambition that the Trust has.

ICECAP has been established by Professor Stables in 2016 to facilitate multi-centre clinical trials centrally managed by LHCH. This brings new digital technology through the use of an online clinical trial database, an online electronic trial management system and a shared file system for governance to enable remote working. ICECAP is providing support for a number of trials such as CRAFT (currently in recruitment and follow up phase), RADIAL and

LAUDABLE. The strength of ICECAP comes through the use of electronic systems and hence is highly dependable of robust IT infrastructure.

There is a significant need to fully update the IT infrastructure in Research; it needs to be aligned to the IT strategy for the Trust, but with a focus on easy implementation of external commercial systems for clinical trials (mindful of the impact of GDPR) and proper video conferencing facilities, which are being more and more used by Prof Lip and his international team of researchers.

7. The next three years

We are at a point when we should be moving away from a vision for research based on business as usual, and jump into more challenging but exciting possibilities. We acknowledge our excellent track record running interventional clinical trials; however, it is important to challenge ourselves and explore new themes and areas of research. Therefore, the vision for the 2020-2023 R&I strategy is:

“To lead all aspects of cardiothoracic research in our health system”

This vision is fully aligned to our Trust vision of being the Best.

Growing and strengthening intrinsic research and innovation at LHCH, whilst developing new areas of research will be the foundation stones for this new strategy.

This will only be possible through our strength for delivering translational research, as the site of choice for bringing bench to bedside clinically.

This strategy will look at placing LHCH research at the core of all heart and chest research and innovation in Liverpool and the wider system; leading with the existing networks and supporting organisations. As an example, a new partnership with Alder Hey Hospital is in place to lead the respiratory research from childhood to adulthood in our health system as part of the Alliance of Specialist Hospitals.

7.1. Strategic objectives.

The above vision can be achieved by implementing 3 principles

- a) Providing a bespoke range of research services to accommodate all types of trials
- b) Collaborate with regional, national and international organisations
- c) Investing in our staff

This will enable us to deliver the following objectives:

1. Build on and invest in our identified current international strengths including in clinical trials on surgical interventions in cardiovascular disease by:
 - 1.1 growing the number of new LHCH-led clinical trials and studies, maximising the benefits of our in-house trial management system developed by the team in ICECAP
 - 1.2 growing the number of successful grants
 - 1.3 supporting the allocation of research time as part of job plans aligned to research performance
2. Attract and deliver high quality commercial research by:

- 2.1 Establishing new links with ABPI (Association of British Pharmaceutical Industry) and also medical devices organisations (such as the Association of British HealthTech Industries – ABHI)
- 2.2 Improving the governance process for clinical trials approval, aligned to LHP joint research service
- 3. Continuously develop our resources and our academic profile by:
 - 3.1 Becoming a University Hospital as part of the UK University Hospital Association
 - 3.2 Establishing new clinical academic positions in collaboration with our academic partners
 - 3.3 Continuous development of our research support staff
- 4. Embed and grow the Liverpool Centre for Cardiovascular Science (LCCS) by:
 - 4.1 Expansion of basic science and translational medicine
 - 4.2 Delivering Phase II clinical trials at LHCH
 - 4.3 Maximise the use of big data to build a CVD related collaboration with Public Health and Epidemiology
 - 4.4 Applied health research and patient-centred research
 - 4.5 Develop research on other clinical areas, i.e. exercise and AF, congenital heart disease
 - 4.6 Community engagement and involvement
- 5. Grow our own by:
 - 5.1 Forming the next generation of chief and principal investigators:
 - 5.1.1 Promote individuals to apply for the NIHR Research Scholars Programme and the MRC CARP Fellowship Programme
 - 5.1.2 Promote research through the Job Planning Process with medical and surgical staff receiving additional research PAs
 - 5.1.3 Create academic accountability with formal research appraisal
 - 5.1.4 Create opportunity for formal academic progression from honorary Lecturer, Senior Lecturer, Associate Professor and Professor
 - 5.2 Leading new NIHR portfolio studies
 - 5.3 Comparative effectiveness studies run by ICECAP
 - 5.4 Development of Electronic Clinical Trial Management system for LHCH-led studies
- 6. Develop new areas of research and innovation:
 - 6.1 Cardiac imaging – aligned to the development of Dr Tim Fairbairn as a MRC Fellow delivering NIHR applications for research studies. This is a continuation of his NIHR Research Scholar status.
 - 6.2 Cardio-oncology – aligned to the new service led by Dr Rebecca Dobson jointly with Clatterbridge Cancer Centre.
 - 6.3 Robotic surgery – aligned to the surgical activity both in cardiac and thoracic cases. There is a clear need to identify the health economic value of robotic practice in the healthcare system we are in, and in the NHS as a whole. Robotic surgery impacts on length of stay and recovery time, but also the ability of patients returning to work within the week of having cardiac robotic surgery, compared to months for recovery. Mr Michael Shackcloth leads the thoracic theme, whilst Mr Paul Modi leads on the cardiac theme.
 - 6.4 Development of new lung cancer therapies - aligned to the appointment of Professor Ottensmeier and his research area, and the appointment of a new Senior Clinical Lecturer in collaboration with the University of Liverpool.

- 6.5 Artificial Intelligence to support clinical delivery –the Trust has an agreement in place with industry for the use of AI to facilitate radiology reporting; experience gained from this will guide the next phase to develop tools for early identification of disease based on existing clinical data. Dr Caroline McCann will be the lead for this new area of research.
- 6.6 Genomic research – nationally, NHS Genomics England has identified seven centres to provide Genomic services. They must also be centres for research and innovation. Although the Northwest centre has its hub in Manchester, there is significant reasoning for Liverpool to house a series of spokes or units aligned to rare conditions and the NHS specialist providers. Given our expertise and track record with the Inherited Cardiac Conditions service, we will work towards becoming the Cheshire and Merseyside Cardiac and Respiratory Genomic Unit, with a clear research plan supported by the clinical service, under the leadership of Dr Victoria McKay
7. Increase our financial position by:
 - 7.1 Growing the number of commercial studies
 - 7.2 Providing evaluation services to external partners.
 - 7.3 Creating a seed fund for the promotion of research and innovation among LHCH staff through support of early stage projects.

7.2. Finance.

We have already referred above to the importance of having the right resources, and having the required funds will be pivotal to the success of the new strategy.

R&I finances are dependent on external funding.

a. Income.

LHCH Research receives income through three main streams:

- a) Clinical Research Network North West Coast. This covers the costs of our research support team. The yearly allocation has been reducing year on year since 2015/16, due to the budget cuts from the Centre.
- b) Charity. In previous years the LHCH Charity used to support the R&I activity at the Trust by providing £50,000 each year. However, in recent years, and given that the Trust expectation is for the R&I activity to be self-funding, the charitable contribution has been reduced to £20,000 yearly from a direct contribution from the Lord Leverhulme Charitable Trust for research at LHCH.
- c) Commercial income. This is a reflection of the commercial activity from clinical trials at the Trust. This income is received and placed in reserves to be used to balance the accounts at the end of the year.

b. Expenditure.

Examining the actual expenditure across all cost centres under R&I, we can see the increase in expenditure in the core R&D team in 2018/19, in comparison to 2017/18. There is a request to consolidate R&D and clinical trials as one cost centre, as the existing breakdown is not consistent with the new structure of the Department.

Expenditure	2017/18	2018/19	2019/20
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R&D	594	841	1,074
Clinical Trials	843	828	386
Cardiac Lab	80	72	81
Pharmacy	25	25	25
Radiology	48	48	48
Year Total	1,590	1,814	1,614

The larger expenditure in R&D between 2017/18 and 2018/19 includes the renovation works in the research laboratory linked to the arrival of Prof Lip and the Liverpool Centre for Cardiovascular Science as well as pay rewards for Agenda for Change staff.

The difference between 2018/19 and 2019/20 is due to the transition of staff from clinical trials budget code to R&D budget.

c. Balance sheet position.

	Opening balance 2019/20 (£)	In year movement (£)	Closing balance 2019/20 (£)
R&I Deferred income	466	-18	448
Principal Investigator funds	964	-297	667
Total	1,430	-315	1,115

d. 2020/21 Budget.

For this year, we are expecting that our commercial income will be slightly higher than last year, given the recent growth we have seen in new clinical trials and the pipeline in place.

The charitable contribution will continue to be at £20,000 as the Lord Leverhulme Charitable Trust has renewed our grant for another 5 years from 2019.

The CRN NWC contribution is further reduced in line with the reduction received by the network and transferred to all providers.

	CRN NWC	Charity	Commercial	Total
Income	375,132	20,000	1,200,000	1,595,132

Expenditure	Pay	Non-Pay	Total
Cardiac Lab (Research Lab)	67,000	17,000	84,000
R&D	964,000	66,000	1,030,000
Clinical Trials	207,000	148,000	355,000
Pharmacy	28,000		28,000
Radiology	48,000		48,000
Total			1,545,000

The success of the strategy will be dependent of the organisational change of the Research department, with the creation of new posts, which implies new investment in our resources:

Position	Cost (£ 000s)
3x AfC Band 7 (2x Sr nurse/ 1x admin)	20-150
2x AfC Band 4 Data Manager	48
1 x Clinical Trials Physician	50
Research Ambassador (re-banding)	10
Total	128-258

Although this is a new cost pressure in our budget, it is one that has been identified as essential to deliver the challenging objectives set up by this strategy. The expected growth in commercial activity and in grant income will be the foundation for this investment.

7.3. Key Performance Indicators.

We will align our performance to the mandatory High Level Objectives (HLO) from NIHR:

- HLO1- Deliver significant levels of participation in NIHR CRN portfolio studies.
- HLO2 – Deliver NIHR CRN Portfolio studies to recruitment target within the planned recruitment period
- HLO3 – Increase the number of studies delivered for the commercial sector with support from the NIHR CRN
- HLO6 – Widen participation in research by enabling the involvement of a range of health and social care providers
- HLO7- Deliver significant levels of participation in the NIHR CRN Portfolio dementias and neurodegeneration studies – Not relevant to LHCH
- HLO8 - Demonstrate to people taking part in health and social care research studies that their contribution is valued
- HLO9 - Reduce study site set-up times for NIHR CRN Portfolio studies by 5%.

Our performance will be benchmarked to our current baseline and will be reflective of the challenges ahead.

The table below shows the Key Performance Indicators used to measure the progress and success of the strategy. A comprehensive table aligning our strategic objectives with NIHR High Level Objectives can be seen in Appendix 2. This will be the tool used to monitor progress.

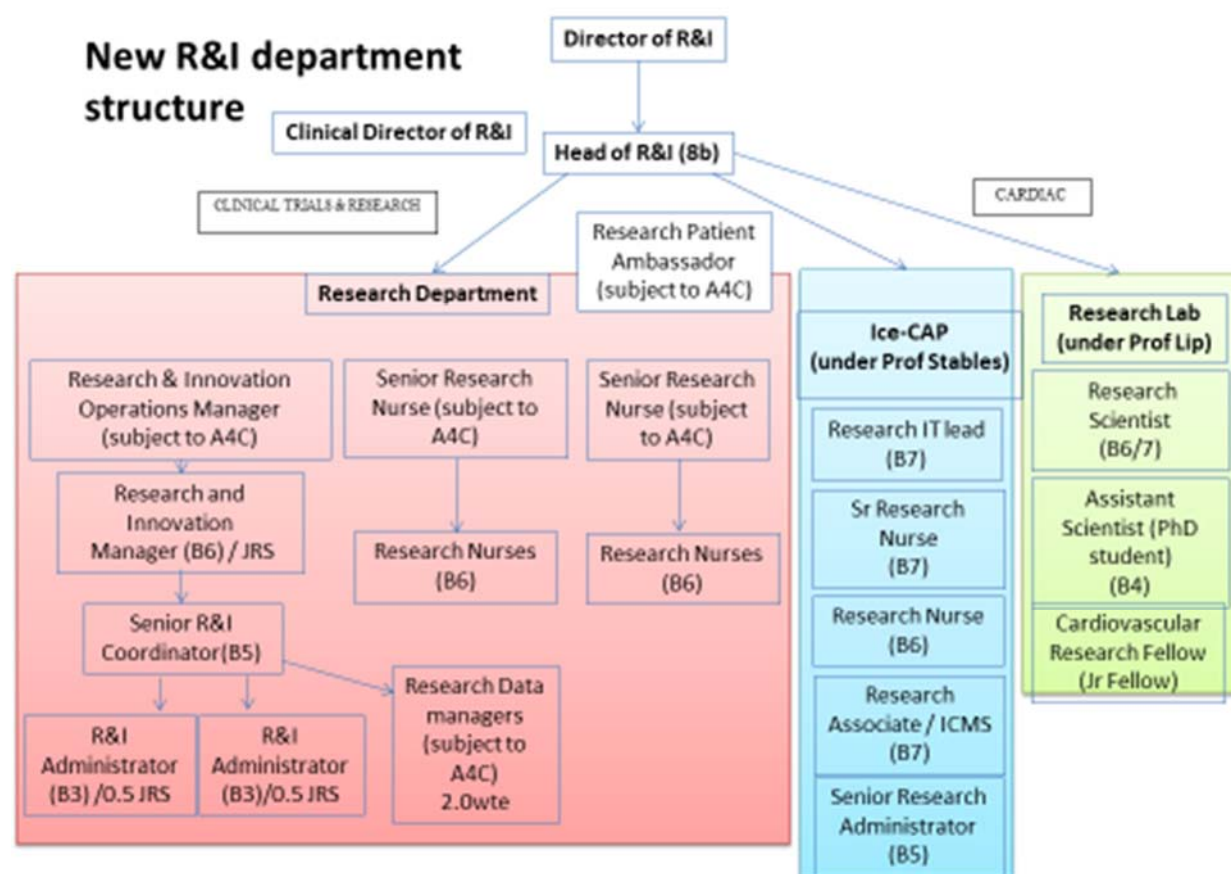
Local KPIs	2019/20	2020/21	2021/22	2022/23
Research				
Number of peer reviewed publications with LHCH affiliation since April 2019	150	165	185	200
Number of citations with LHCH affiliation in the top 1% highly cited threshold	20	22	25	28
Number of LHCH clinicians involved in research studies	20	22	24	26
Number of LHCH clinicians acting as Chief Investigators	4	5	6	7
Number of registered higher degrees	6	8	9	10
Number of submitted grant applications	4	6	8	10
Number of successful grant applications	1	2	2	3
Recruitment against agreed target	900	1,200	1,250	1,300
Number of new studies- pipeline	35	38	40	42
Number of studies open since April 2019	16	20	22	25
Time to set-up (median number of days)- (a)commercial	60 days	60 days	60 days	60 days
(b) non commercial	30 days	30 days	30 days	30 days
Time to first recruit - (a) commercial	30 days	30 days	30 days	30 days
(b) non commercial	60 days	60 days	60 days	60 days
Innovation				
Number of ideas put forward	4	6	8	10
Number of ideas developed to prototypes	1	1	2	2
Number of ideas with commercial interest	1	1	2	2
Number of innovations brought to the Trust	9	10	12	14

7.4. Conclusion

This is a new strategy for Research & Innovation at LHCH targeting growth and leadership at a system level. It starts from the strong position reached by the delivery of the previous strategy, harnessing on the elements we deliver consistently as part of our business as usual, and targeting new areas of expansion based on the knowledge and appetite of our researchers.

It will further support placing the Trust at a prominent position as cardiothoracic specialist unit in the region, securing our place as system leader not just for clinical service, but also for research and innovation. It will provide a robust basis for our academic ambitions; the development and growth of LCCS sees a strong academic rigour applied to the research ethos at the Trust.

Appendix 1. Research & Development Department organisational structure.



Appendix 2. KPIs for new R&I strategy. Alignment to NIHR High Level Objectives

Strategic objective	Sub-objective	NIHR High Level Objective	Progress 2020/21	Progress 2021/22	Progress 2022/23
1. Build on and invest in our identified current international strengths including in clinical trials on surgical interventions in cardiovascular disease	1.1 growing the number of new LHCH-led clinical trials and studies	HLO1			
	1.2 growing the number of successful grants				
	1.3 supporting the allocation of research time as part of job plans aligned to research performance				
2. Attract and deliver high quality commercial research	2.1 establish links with ABPI and other medical devices organisations				
	2.2 improving the governance process for clinical trials, aligned to LHP JRS	HLO1, HLO2, HLO3, HLO6, HLO9			
3. Increase our resources	3.1 becoming an University Hospital part of UKUHA				
	3.2 establishing new clinical academic positions				
	3.3 continuous development of our research staff				
4. embed and grow the Liverpool Centre for Cardiovascular Science	4.1 Expansion of basic science and translational medicine				
	4.2 delivering Phase II clinical trials at LHCH				
	4.3 maximise the use of big data to build a CVD related collaboration with PHE and Epidemiology				
	4.4 applied health research and patient centred research				
	4.5 develop research in other clinical areas: exercise and AF, congenital heart disease				
	4.6 community engagement and involvement	HLO6, HLO8			
5. grow our own	5.1 forming the next generation of chief and principal investigators				
	5.2 leading new NIHR portfolio studies	HLO1, HLO2, HLO9			
	5.3 comparative effectiveness studies run by ICE CAP				
6. develop new areas of research	6.1 cardiac imaging				
	6.2 cardio-oncology				
	6.3 new lung cancer therapies				
	6.4 Artificial Intelligence				
	6.5 Genomic Research				
7. increase our financial position	7.1 growing the number of commercial studies	HLO3			
	7.2 providing evaluation services to external partners				
	7.3. creating a seed fund for promotion of research and innovation among LHCH staff				

Appendix 3. Academic affiliations with LCCS

This table represents all the staff from the partner institutions that are affiliated to LCCS. It is important that we promote LHCH staff to be part of this list. The second part of the table, “Associate Members” includes LHCH staff linked to LCCS.

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