Gwyddor Gofal Iechyd Cymru
Healthcare Science Cymru

Research & Innovation for Healthcare Science Professionals in Wales:

A Five Year Strategy 2024-2029

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Contents

Foreword

The national health service provides for the population across a complete continuum from public health to primary, secondary, tertiary and social care. This mirrors the journey that we will all make with our health, from self-management, presentation, evaluation, diagnosis, to management, treatment, rehabilitation. Healthcare Science professions have a significant role for patients in every one of these stages.

There are more than 50 different professions within the Healthcare Sciences, each with their own unique characteristics, including direct patient care and rehabilitation, provision of the majority of diagnostics, medical equipment management, research and innovation. The professions keep evolving as new scientific evidence emerges, and as new ways of providing and organising care are developed and implemented.

Healthcare Science professionals are fundamental not only for the services they provide, but for bringing in new and integrated ways of providing care, using innovation and evidence to improve and change thereby increasing value for patients and the broader system. In a challenging landscape, harnessing the research and innovation skills in these professions will contribute to the Welsh Government long term plan of achieving a healthier Wales for all.

From Genomics, through to new innovative technologies and artificial intelligence, health board and trust chief executives will benefit from harnessing leading expertise to resolve key health and wellbeing operational challenges, in addition to supporting the retention of our best healthcare scientists across Wales.

Executive Summary

The first of its kind, this research and innovation strategy sets out a vision and accompanying blueprint specific to our NHS Wales Healthcare Science workforce. It appreciates the differing needs and challenges of its varied workforce and provides a roadmap, not just a destination, to maximise our potential and realise significant contributions to research and innovation, regardless of the starting point.

This plan supports the Welsh Government drive to embed and integrate research into all aspects of health and care services in NHS Wales. It also acts in accompaniment with the many positive steps already taken to raise the profile of Healthcare Science. In addition to our strategic plans to establish ourselves as recognised key contributors of research, innovation, and the transformation of clinical practice, this is also a timely response to the growing needs of NHS Wales and assurance of its longevity.

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Healthcare Science professionals: Who are we?

We are clinical, we research, we innovate, we educate, we improve, we lead!

Healthcare Science remains a lesser-known sector of the healthcare workforce and yet makes up 6.7% of NHS Wales, with over 7000 Healthcare Science professionals across over 50 specialties. Healthcare Science professionals themselves may not even be aware that they form part of this sector, identifying only with their specific specialty.

We can be grouped into:

- Laboratory Sciences
- Physiological Sciences
- Physical Sciences
- Clinical Computational Sciences
- Radiographers
- Operating Department Practitioners (ODPs).

We are a very skilled and specialised workforce, even though we are small in size, and we play a role in more than 80% of all clinical diagnoses.[1] We dedicate ourselves to providing investigations, diagnoses and therapies for the betterment of our patients, delivering heavily relied upon services such as imaging, physiological measurement, laboratory testing, bioengineering and many more.

Scientific enquiry, evidence-based practice and continual improvement is the driving force of our professions, evidenced in our training, our innovations, and our continual advancements in practice.

Since the inception of the NHS, we have mostly remained a hive of activity away from the public eye, supporting our fellow healthcare professionals to deliver evidence-based practice in almost every aspect of healthcare. It's now time to raise our profile and demonstrate our ability to lead, challenge current ways of delivering healthcare and nurture our inner scientist.

We must challenge ourselves to engage and to establish ourselves as the key researchers and innovators that we have every potential to be, driving forwards the NHS Wales Framework 'Research Matters'.[12] We believe this is paramount to transforming our NHS services and achieving a healthier Wales.

Background

In line with Welsh Government's long term strategic plan 'A Healthier Wales' [2], research and innovation are essential factors of change, along with quality and value-based healthcare improvement. NHS Wales faces difficult challenges ahead: a 25% increase in the number of people over 65 years living in Wales by 2030 and the number living with multiple long-term health conditions will double by 2035[3,4]. This increasing demand on healthcare services is outstripping capacity and requires new, radically transformative solutions, as highlighted in the NHS Wales planning framework 2024-2027[5].

In response to these challenges, Welsh Government supports the facilitation of research and innovation across NHS Wales.[2, 12] Particular emphasis is on improved integration of research within clinical roles and the enabling of all staff within NHS Wales to apply themselves to the development of new knowledge and advancing healthcare provision through innovative practice.

This is to be achieved through the nurturing of continual learning and development, and through active engagement in improving patient care and service delivery. Healthcare Science professions are no exception to these plans, in fact they play a pivotal part, with the new First Minister citing Welsh Government priorities to quicken diagnoses, improve cancer survival rates, and streamline healthcare services with technological advancement and innovations.[6]

Through innovation, we challenge and evaluate current ways of working, identifying and developing novel processes, pathways, and tools, to establish more cost-effective, equitable and sustainable whole systems approaches to delivering healthcare. Equally, research provides the exploration needed to identify what we currently know, what is yet to uncover, and to evaluate new ways of providing healthcare that enhance patient experiences and outcomes.

Within these challenges lies opportunity, the chance to evolve, overcome, and rise to the challenge. As demonstrated in our response to the recent pandemic, we are no strangers to adversity and continue to mobilise and strengthen in response to any difficulties that lie in the way of healthcare excellence.

Emphasis is not only on increasing our capacity to undertake research and developing innovative thinking, but also to ensure improvements are scalable and shared nationally. Timeliness of adoption is also key and requires an NHS Wales that is both coordinated and well-connected. This requires long-term vision and an openness to learning and collaborating with others, both across healthcare systems and with trusted partnerships with industry and academic institutions.

Enabling more of us to make significant contributions to healthcare research and innovation will help nurture our skills of scientific inquiry. Utilising the highly specialised knowledge and expertise from our professions will improve

prevention, quicken diagnosis, and tackle increasing demand. Ultimately, the recommendations within this strategy aim to achieve just that, helping to realise the 'Healthcare Science in NHS Wales' framework's ambitions of raising the professional profile of Healthcare Science and enabling us to be key players in service transformation.[7]

Development of the strategy

This strategic plan outlines the Healthcare Science vision for increasing research and innovation in the profession, aligned with the priorities outlined in Welsh Government's 'A Healthier Wales'[2], 'Diagnostics Recovery and Transformation Strategy for Wales'[7], and 'Healthcare Science in NHS Wales – Looking Forward Framework'[1]. It also aligns with recommendations and plans spanning across the whole health and social care workforce in Wales, as outlined by Health and Care Research Wales (HCRW) in their review 'Making Research Careers Work'[8], with the NHS Wales Research and Development Framework: 'Research Matters'[12] and with work underway for Nursing and Allied Health Professionals (AHPs).

It was developed through the Healthcare Science Programme within Health Education and Improvement Wales (HEIW) and the Healthcare Science Research and Innovation Working Group (HCS RIG).

It was informed by members of the Healthcare Science profession across Wales, spanning all specialties. Oversight was provided by the Healthcare Science Network and Healthcare Science Programme Board, with input from senior Healthcare Science professionals, Executive Directors of Therapies and Health Science (EDoTHS) and Assistant Directors (ADoTHS), and Welsh Government representatives.

Scope

This document will be important to the following:

- HCRW and policy leads within Welsh Government responsible for supporting research and innovation.
- Leaders in NHS Wales such as EDoTHS, ADoTHS, Chief Executives, Research and Development directors and all responsible for research and innovation.
- Professional and regulatory bodies associated with Healthcare Science professions, to support a future workforce involved in research and innovation.
- Healthcare Science professionals at all career levels and in all health boards and trusts, regardless of current involvement in research and innovation.
- Higher Education Institutions (HEIs) across Wales, in the education and training of the Healthcare Science workforce and as key partners in NHS research, including research active, clinical academic roles in Healthcare Science.
- Other members of the NHS workforce to recognise our potential and innovate in partnership with Healthcare Science professionals.

Our vision:

For research and innovation undertaken and led by Healthcare Science professionals to play a key part in evidencing and delivering A Healthier Wales.

Our mission:

1. To increase our research capacity and ensure all Healthcare Science professionals have opportunity to engage in research and innovation, across all career levels.
2. To improve the engagement of Healthcare Science professionals as leaders in research and innovation across NHS Wales.
3. To cultivate an environment in Healthcare Science that encourages rigorous scientific inquiry, patient-centred, value-based innovation and continuous professional development to address prevalent health challenges in Wales.

Section 1: Research and Innovation In NHS Wales

Defining research and innovation

Before introducing steps to improve research and innovation, these terms and their relationship to one another must first be appropriately defined.

What is research?

The UK Policy Framework for Health and Social Care Research provides the nationally adopted definition for research within the context of health and social care work[9]; "Research is defined as the attempt to derive generalisable or transferable new knowledge to answer or refine relevant questions with scientifically sound methods." Research is therefore distinct from activities such as audit, service evaluation (SE) and quality improvement (QI). For activities to be supported as research they must receive regulatory approvals via Health Research Authority (HRA) and Health and Care Research Wales. They should also preferably be part of an ongoing programme, which ultimately builds through each phase of work. To help determine whether a piece of work is determined as research, the HRA provides a decision tool available online: https://www.hra-decisiontools.org.uk/research/

What is innovation?

In comparison to research, the definition of innovation remains more elusive and up to interpretation. All interpretations however recognise that innovation is the creation or identification of something new and of value. Examples of innovation within healthcare would include any novel product, technology or process that provides value in achieving more prudent healthcare or enhancing patient experiences and outcomes10. Innovation takes new ideas and realises them to make impactful, positive, and transformational change. The diagram in Appendix 1 demonstrates the process of innovation, from conception to widespread adoption.

How are research and innovation linked?

Research and innovation are inexplicably interlinked but their relationship to one another is often interpreted differently. They may be considered as overlapping entities, as two poles ends of a spectrum (as illustrated in Figure 1). Research focuses on the identification of new knowledge, whereas innovation is an iterative process of idea development with the disruption and betterment of current practice. Both are needed to identify, create and test evidence driven change that improves healthcare provision.

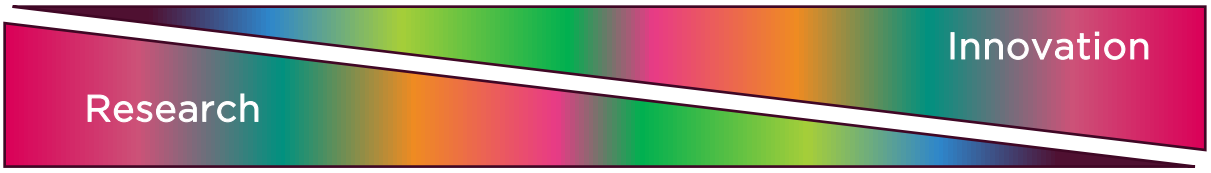


Figure 1: A illustrative example of the relationship between research and innovation

Making the case: Why is research and innovation important?

The benefits of increasing our capacity to engage and become leaders in healthcare research and innovations are four-fold:

Benefit to our patients- Research and innovation enables evidence-based practice and can bring about new methods and technologies, advancing the delivery of healthcare. This takes many forms such as early diagnoses and prevention, to innovative ways of treating healthcare conditions, reducing the mortality rates and the impact of debilitating diseases. By involving and collaborating with our patients in research, we ensure that improvements made to NHS Wales are patient centred. The myth that spending time on research and innovation work is at the detriment to clinical duties has long been dispelled. It is evidenced that research and innovation have and continues to drive positive and necessary changes to patient satisfaction, experience, and outcomes[11, 12].

Benefit to our staff- The well-being of our staff is crucial to the success of NHS Wales and its ability to deliver quality healthcare. Enabling staff to engage in research is linked with improved job satisfaction, staff retention and ability to recruit from outside Wales[12]. Enabling the advancement of our research skills, our leadership capabilities and our influence on service and pathway changes empowers the NHS workforce within Wales to provide the best possible patient care, making NHS Wales an exciting place to work.

Benefit to our NHS- These impacts are pivotal to the sustainability of our healthcare system and its ability to provide an excellent service to our nation, that is value for money. Even more than that, NHS Wales benefits from intellectual property (IP) through innovative product and technology design, funding grants and clinical trials, collaborating with pharmaceutical, biotech and Artificial Intelligence (AI) companies to create a source of revenue, enabling us to improve NHS Wales even further. Being a relatively small nation, consisting of 7 Health Boards and 3 NHS Trusts, we have the potential to become a well-connected, united health service that can celebrate our differences to our neighbouring countries.

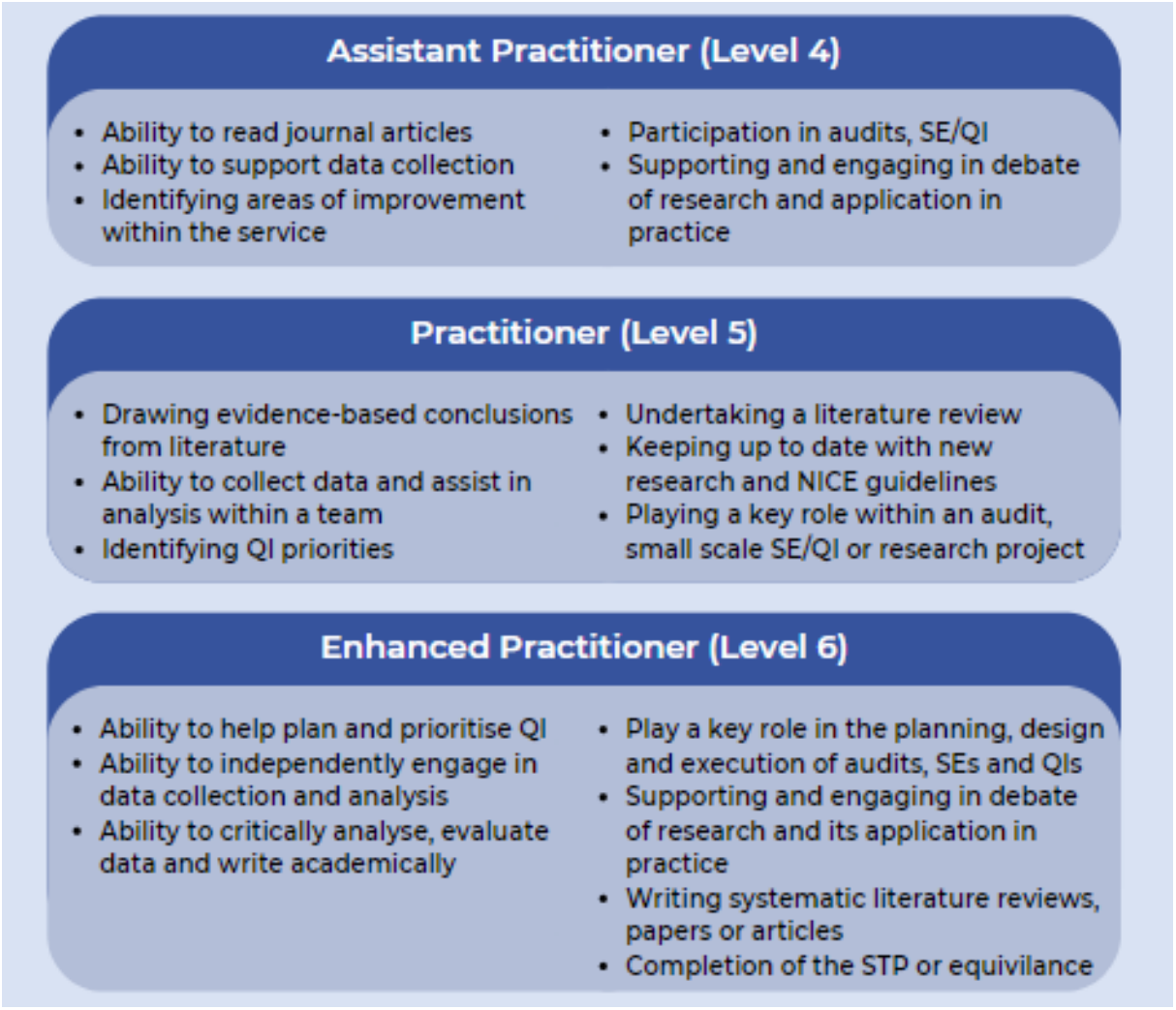
Benefit to our Welsh economy- Developing new, cutting-edge technologies can help bring about partnerships with industry, driving business investment into Wales and supporting the foundational economy. And where better than the

birthplace of the NHS? Attracting industry into Wales can provide a significant source of income and bring about positive changes to Wales's job market, increasing job prospects in Wales and allowing our innovative thinkers to flourish, whilst remaining in Wales.

Incorporated into career pathways

Throughout our careers we undertake activities and develop essential skills that build our ability to undertake quality research and develop innovative thinking. This tacit process is however dependant on culture and opportunities available.

Figure 2 maps the minimum expected skills with example activities for different stages of our career. This was guided by the Academy for Healthcare Science (AHCS) 'Good Scientific Practice'[13] and the curricula throughout the Practitioner Training Programmes (PTP), Scientific Training Programmes (STP) and Higher Specialist Scientific Training (HSST) Programmes[14], and for Radiographers and ODPs by the Health and Care Professional Council (HCPC) standards of proficiency.[15,] This is not exhaustive, and many professionals align with several of these levels at any one time.



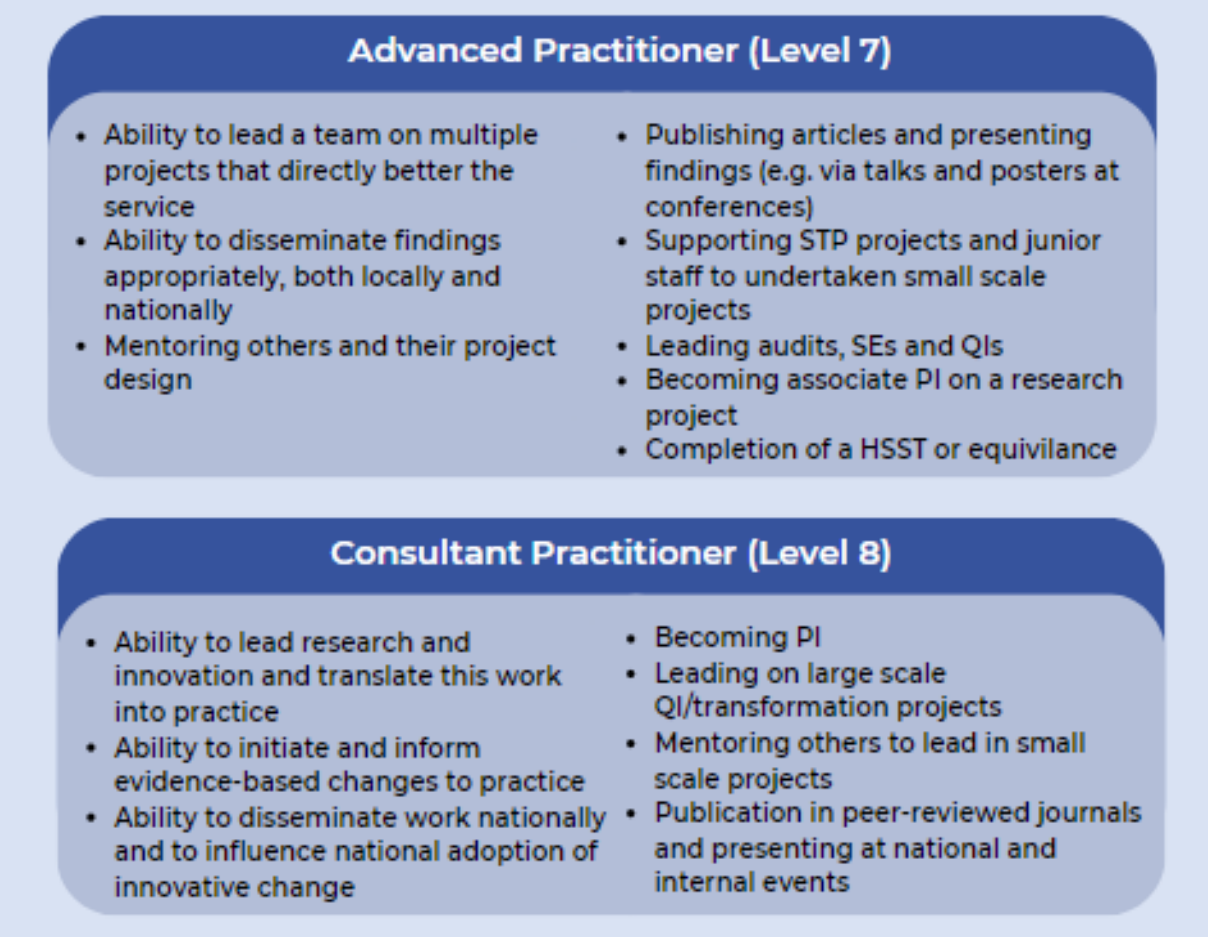


Figure 2: Minimum research and innovation skills and activities across Healthcare Science career levels

Service evaluation (SE) and Quality improvement (QI) are a core part of innovation and are fundamental to all stages of the career. In more junior career stages, involvement in SE/QI work may be supporting and participatory, developing into leadership of projects. Additionally, an SI project could be a relatively small or incremental change to the service but with significant impact to patient outcomes. Or it can span across services and sites, requiring specialist knowledge, a whole-team approach and rigorous inquiry.

Similarly, opportunity for involvement in research will increase with experience and training e.g. in bid writing or health economics. Early career involvement is essential to awareness of research and its role in service delivery. With experience of data collection and developing analytical skills, this will evolve into a participatory role, before becoming site Principal Investigator (PI) or an associate PI. PI opportunities are available on the NIHR portfolio, accessed via R&D departments. It is of note that PI experience is a key part of Clinical Scientist training.

For those looking to support trainees or develop either to consultant roles or towards a career as a clinical researcher, their role in research may continue to evolve from PI to Chief Investigator (CI), leading to larger transformational

research with substantial funding, with a multi-disciplinary team and collaborating with HEIs and industry.

For those specifically engaging in a clinical researcher career, Figure 3 provides an outline of skills and activities to guide early researchers and raise awareness of this alternative career focus. To develop a career as a clinical academic or clinical researcher, the ability to undertake and lead independent research and to publish this contribution to new knowledge is a crucial element to be achieved.

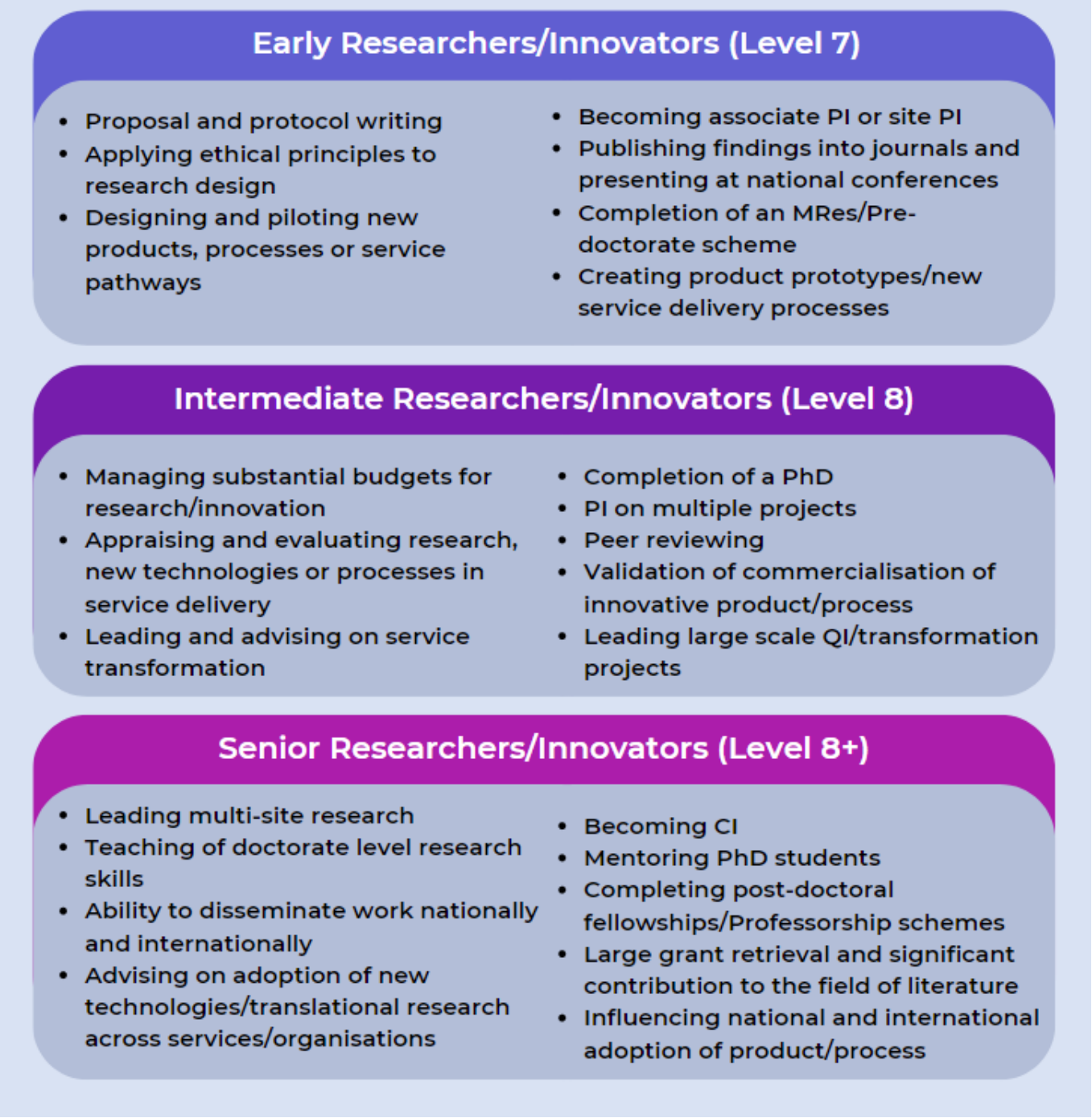


Figure 3: Skills and activities for a career in Healthcare Science research and innovation

Although the titles of Clinical Academics and Clinical Researchers are sometimes used interchangeably, for the purpose of this strategy they are defined as followed:

Clinical Academics: Clinical Academics are individuals who work both within academia and in healthcare. Their work in HEIs is typically substantive and involves commitments to education as well as research.

Clinical Researchers: In contrast, Clinical Researchers are primarily healthcare based, although have close relationships with academia and may acquire some teaching responsibility through honorary contracts with HEIs. Their work focuses more on research within NHS services, promoting and supporting a research culture.

Both roles are crucial within Healthcare Science to strengthen relationships between NHS Wales and academia, alongside facilitating research and mentoring researchers.

Current opportunities: funding, training and support

Healthcare Science professions have access to a wide range of opportunities to develop their career in research and innovation.

In addition to those provided through formal training programmes such as the Scientist Training Programme, there are also a range of developmental research grants, formal education, fellowship programmes, short courses and workshops.

Current opportunities have been mapped based on the career levels outlined above; examples of these for the pre-doctoral, early researcher career stage are illustrated in Appendix 2.

For research, there are training and funding opportunities available at each stage of the professional career pathway and/or an individual's research journey. Conversely, for the equivalent in innovation it is far less clear what is available.

This mapping has demonstrated that there are also further developments needed:

- Whilst a range of opportunities exists for Healthcare Science to engage and develop in research and innovation, these tend to be developed through professional bodies and therefore not available within all professional areas.
- There are a wider range of grant opportunities and resources in other sectors of the NHS workforce. Some schemes exclude or fail to visibly include Healthcare Science.
- Through more open awards, we increasingly face competition for grant opportunities against larger NHS workforces, other health workers and clinical academics working mainly in HEIs who can dedicate more time and

support into applications. This is particularly problematic with opportunities that include salary, that are few in number and are essential for NHS research to be undertaken.

- Although opportunities that include salary do exist, fragile services with staff shortages within Healthcare Science struggle to pursue these due to lack of availability of additional staff to backfill the time. Reliance on existing staff working additional hours risks burnout, and bank workforce roles are not commonly in place.

Section 2: Current Landscape

Participation in research and innovation

Audit of research activity:

To understand our current contribution to research, an audit was conducted whereby R&D departments in all Health Boards and Trusts across Wales were asked to identify research undertaken or supported by Healthcare Science professionals between 2021 and 2023.

As professional occupation is not yet a mandatory field to be recorded by R&D departments, and the professions that Healthcare Science comprises of is not well understood, the results demonstrate only a fraction of our activity. This also does not consider service evaluation, improvement, or wider innovation.

Summary of audit findings:

- Nearly 400 studies in total were identified overall. Cardiff and Vale University Health Board reported the highest number of studies involving Healthcare Science professionals. Velindre University NHS Trust had the highest proportion of Healthcare Science research activity when considering their workforce size.
- Laboratory Science were the largest contributors to research within Healthcare Science both in a supportive and leading capacity, with the highest proportion of research active staff compared to other areas of Healthcare Science.
- No studies were identified as involving ODPs.
- Our involvement in research is primarily in supporting and enabling the research of other professionals, leading in only 15% of the studies identified.
- Our research partners include a wide range of academic institutes across the UK and industry partners worldwide.
- Most of our research is externally funded (83%), with an average grant income per study of £54,376.
- The majority of studies were focused on themes of cancer, cardiovascular disease and microbiology.

Named Chief Investigators:

From over 2000 studies listed on the NIHR portfolio in 2023, a total of 8 Chief Investigators (CIs) were identified from the Healthcare Science workforce. Estimated proportions within each workforce are shown below, based on NIHR portfolio records and NHS Electronic Staff Record (ESR) workforce data. This places Healthcare Science close to AHPs but far lower than the number of medics and dentists that are CIs.

Profession	Estimated % workforce who are CIs
Healthcare Science	0.11%
Allied Health Professionals	0.16%
Medical & Dental	1.64%
Nursing, Midwifery & Health Visitors	0.02%

Engagement with Health and Care Research Wales (HCRW):

Our awareness of and engagement with current opportunities is important to analyse when considering how best to build research capacity. HCRW provides essential information for all experience levels. Subscription to their weekly bulletin is accessible to all, with content covering new, emerging research, funding opportunities and training workshops specific to Wales.

Subscription statistics can therefore provide insight:

- Currently only 30 Healthcare Science professionals subscribe to the bulletin. This is less than 0.5% of the Healthcare Science workforce.
- 60% of the Healthcare Science subscribers are trainee or qualified Clinical Scientists. 10% are Consultant Healthcare Scientists.

Grant funding applications:

Our awareness of opportunities and the ability to win funding awards was also examined. Recent awards were investigated to understand the demography of applicants. This was only possible for grants specific to Wales that record profession:

NHS Research Time Award (HCRW)- This award was specific to NHS staff within Wales and provided protected time to engage in research. Out of the 16 applicants for this award in 2023, only 1 was from a Healthcare Science profession (Biomedical Scientist). From 6 successfully granted, none were from Healthcare Science.

Research Development Awards (HCRW)- HCRW have recently announced the 9 awardees from the HCRW faculty awards: Advancing Research Award, Emerging Research Award and Personal Accelerator Award. From a total of 39 candidates for these awards, a single applicant was from Healthcare Science, working within Informatics. Of the 9 successful awardees, 5 were NHS employees (from medical, midwifery and AHP backgrounds). None were from a Healthcare Science profession.

The Bevan Commission- There has been at least one successful Healthcare Science professional per year throughout the 8 exemplar cohorts since its inception, with 19 Healthcare Science Bevan Exemplars in total (up to 2023).

Research Capacity Building Collaboration in Wales (RCBC)- Since 2019, a total of 6 Healthcare Science professionals have been awarded the First into Research Fellowship with RCBC, 17% of the total number for this award. Healthcare Science awardees came from Radiography, Biomedical Science and Physiological Sciences.

Participation summary:

- Although it may seem that Healthcare Science is at the forefront of research and innovation, this is only true for a few, and most of the activity is supportive and unevenly distributed across Wales and across professions.
- Few Healthcare Science professionals appear to be 'tuned in' to opportunity updates from HCRW and may be missing out on recent developments.
- From the grants investigated, applicants from Healthcare Science are few in number and even fewer are successful against their competition.

Academia & industry at a glance

Academia:

From information provided by the R&D departments' audit of research activity, approximately 26% studies partnered with an academic institute. HEIs across Wales offer a range of Healthcare Science programmes, primarily taught by Healthcare Science professionals, many of whom maintain their clinical competencies with part-time NHS roles or vice versa work part time in the HEI.

These Clinical Academics play an understatedly pivotal role in developing our future workforce. Engaged in research as part of both roles, Clinical Academics are well placed to bridge the gap between academia and clinical practice. Despite this, a reoccurring theme from individuals within these roles was a feeling of isolation, with few Clinical Academics leading research in respective fields and disconnect from Health Boards and Trusts refusing to recognise the title 'Clinical Academic' for those outside of the medical profession.

Of the studies specified within the R&D activity audit, approximately 65% partnered with an HEI outside of Wales – illustrated in Figure 4. One possible explanation for this, aside from funding availability, is that a number of Healthcare Science graduate level training programmes within Wales are relatively new and will likely undergo a development phase before a culture of research can be embedded. Also, for the smaller professions within Healthcare Science, post-graduate training is provided on a UK level, mainly outside of Wales.

Hybrid roles such as Clinical Academics and Clinical Researcher roles can facilitate the sharing of integral research skills within NHS settings and create competitive, collaborative grant applications to undertake high quality research, driven by clinical need.

However, crucial to such triumphs lies in the safeguarding of these roles as facilitators of research and not a 'sole dedicated researcher' within departments. Additionally, many Clinical Academic posts are fixed term, failing to provide stability to these roles and limiting attraction into this career path, an issue also identified in HCRW's review of research careers[8]. More must be done to establish permanent, joint-funded, hybrid clinical research and academic roles in Healthcare Science.

Figure 4: Map of academic partners from the R&D research activity audit

Industry:

Working with commercial partners is a key enabler to undertaking research, building capacity, and developing cutting-edge innovation. It provides a crucial source of income generation to undertake research and/or innovation as well as providing access to novel technology, methodology or treatments. Equally, collaboration benefits industry with real-world evaluation and access to NHS services and highly skilled, experienced staff.

From the R&D departments' audit results, we partnered with industry in 19% of all studies, and in 31% of the studies led by Healthcare Science. Our largest industry partner group was manufacturers of pharmaceutical products, the most prevalent being AstraZeneca. Biotechnology development companies made up the second largest group. Another survey, looking only into the Physiology workforce revealed 4 departments that have been involved in commercial studies over the past two years. This spans across 3 Health Boards and across 4 specialities; Audiology, Neurophysiology, Respiratory and Cardiac Physiology. This demonstrates our ability to collaborate with commercial partners, but also highlights an uneven distribution across Health Boards and across professions. Further exploration would be of benefit to establish whether our involvement with industry is fleeting or intertwined within service.

With MedTech advancements heavily focussed on diagnostics, our key involvement in diagnosis is a valuable asset to research and innovation in these fields[16]. However, to navigate and enter this space and cultivate such relationships a level of entrepreneurial skill is required, a skillset that is currently unrecognised in our training curricula but of increasing importance in future.

Barriers and facilitators

To identify the barriers and enabling factors of undertaking research studies and innovation projects, a range of professional views, opinions and experiences were collated via a series of discussions, interactive polls and online surveys.

Barrier 1 - Time:

Time to undertake research and innovation was considered the main barrier and featured in all responses of a survey sent out in the Healthcare Science Network bulletin. As illustrated in Figure 5, a Physiologist-specific survey identified 66% of services across Wales do not have dedicated time for research. This was found to vary across professional area, between Health Boards and even across same-speciality departments within a Health Board.

Research, development and innovation is a key domain of Healthcare Science professions as indicated in AHCS's Good Scientific Practice 13 and the HCPC standards of proficiency15. And yet, for many, these activities are undertaken outside of working hours or narrowly fitted in between clinical work demands. This issue significantly limits the undertaking of research and innovation, slowing down progress, disincentivising our workforce and leading what could be crucially important ideas to go unnurtured, unsupported, and unrealised. Time is a well cited barrier to research and innovation across healthcare professions8, 17. Job planning and establishing time for research, a core pillar of practice, is now a well-documented necessity18. However, for many sectors of Healthcare Science, desires to make significant contributions in research and innovation appear far-removed from the realities of fragile services.

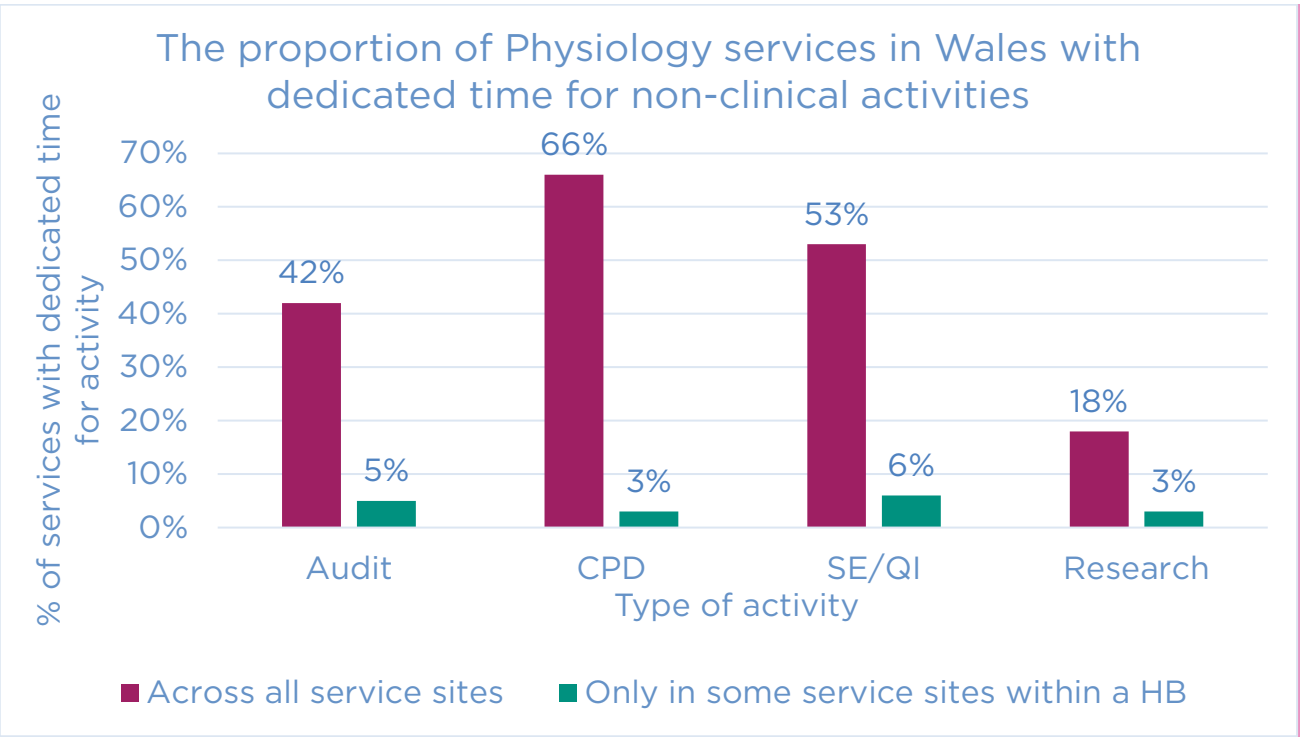


Figure 5: Survey results of physiologist time dedicated for specific activities

To further aid understanding of time for research, a volunteer Consultant Clinical Scientist in Audiology undertook a 4 week time and motion study *(Figure 6)* as an illustrative snapshot, aligning work with the five pillars of practice. 'Research and audit' was further considered as own work, supporting others, or strategic. Overall time for research was felt to be insufficient with little time available to dedicate to own research. Additionally, time was often disrupted and deprioritised by other service demands.

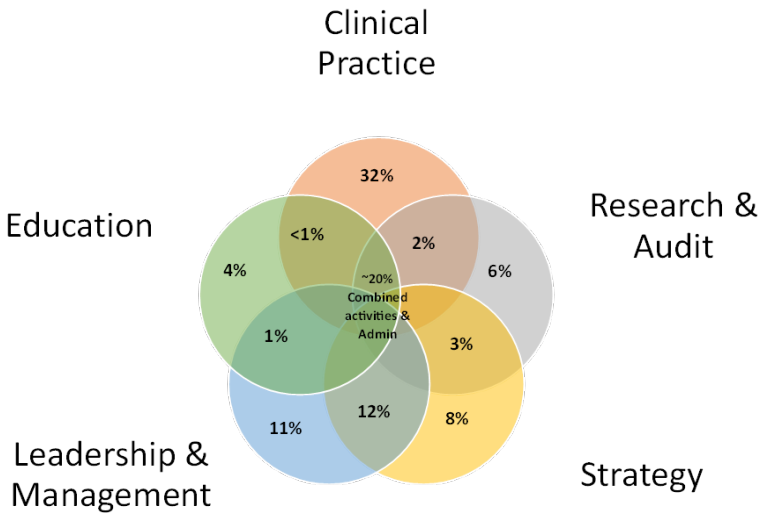


Figure 6: Example breakdown of Consultant Clinical Scientist time for one individual.

Barrier 2 - Current culture & workforce issues:

Workforce shortages and the constant issue of demand exceeding capacity, exacerbated by Covid-19, is said to have put severe strain on our workforce and restrict our ability to nurture an environment conducive of research and innovation. Currently, many Healthcare Science services do not have a strong culture of research; the benefits of research are viewed as far-removed from the pressing priorities of immediate healthcare service provision.

This may explain a lack of engagement with current opportunities as aforementioned. Responses to one survey indicated that opportunities to pursue research are likely to be refused from management, being unable to backfill highly specialised posts. There is also an outdated, but still rather present belief, that research must be led by medical professionals, restricting Healthcare Science professionals to only participate in research in a support capacity.

Healthcare Science professionals who work within 'non-patient facing' roles typically appear to have a more mature culture of research and greater affiliation with the scientific community, possibly ameliorated by stereotypical associations made with such professions and laboratory research. Disparities in culture disadvantage those within professions or locations that do not yet understand the benefits of research and innovation, with difficulty creating gaining support to pursue such work:

"Lack of support from Directorate Management despite positive encouragement from Clinical Board and UHB"
– Rehabilitation Engineer

"Any chance for research is offered to registrars." – Radiographer

In these circumstances, work must be done to establish Healthcare Science-led research as a cultural norm, with buy-in from other professions and management.

Barrier 3 - Lack of supportive networks:

Support networks are integral to successful research and innovation. Novice researchers and early innovators require role models, mentorship and guidance to succeed. Despite attempts to improve this, right now, our workforce seems to have weak connections. Many services work in silos, lacking a collective voice and limiting their influence to demonstrate widescale change. Many other areas of the NHS workforce have established national research councils, journal clubs and research networks, open to all, regardless of experience level.

A review of the support networks available across Healthcare Science revealed some Healthcare Science professions have access to profession-specific research networks or support and resources from their professional bodies. However, this

is not equitable across our workforce, with some professions void of any supportive infrastructure.

Whilst R&D departments can provide invaluable support and leadership for undertaking research, this too may be variable across health boards and trusts, dependent on internal pressures. The new HCRW Faculty in Wales is a positive step forwards, providing peer and expert support for those that have been awarded funding; but those that have been unsuccessful typically remain unsupported. As demonstrated below *(Figure 7),* early researchers may look to more familiar, local sources of guidance initially. A lack of awareness of the Healthcare Science workforce and the roles we play in healthcare provision may also create further barriers to accessing any local support:

"R&D are not aware of our service and have no understanding of how we are conducting the study."- Neurophysiologist

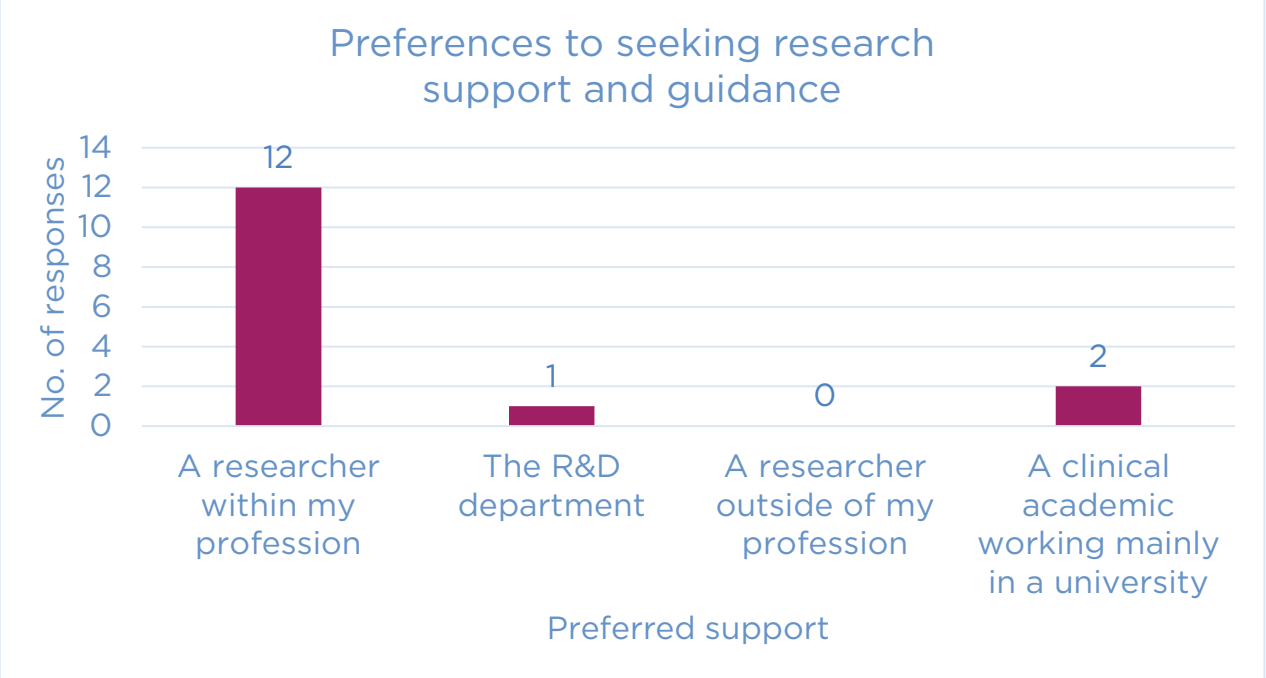


Figure 7: Survey results from a national Neurophysiology meeting when asked 'where would you first go for support and guidance on a research project?'

Barrier 4 - Access to and transparency of resources:

Undertaking research and producing innovative change effectively is reliant on the availability and accessibility of resources. Any inability to readily access profession-specific journal articles, lack of access to assistive research software and issues over availability of space and equipment for research, hinders our work and its scalability. There are a plethora of research and innovation organisations such as the Tritech Institute, Health Technology Wales, Tec Cymru, The Bevan Commission and many more, undertaking exciting, critically important work to transform our healthcare services. Equally for research training, there are various academies, institutes, and hubs within Wales. Particularly for novice

researchers and innovators, the sheer volume of these is said to make information scouting overwhelming and time-consuming. More could be done to simplify this and establish 'built-in' research and innovation infrastructure.

Barrier 5 - Wider issues of career pathways, roles and national organisation:

Several aspects of the career pathway and the roles we possess also repeatedly featured. Firstly, the nature of a career in research and innovation is one of uncertainty, fighting for grants to fund next year's projects and salary. This unavoidable risk-taking, reduces our capacity to encourage members of our workforce to become lead researchers and innovators. It also creates inequality for those with responsibilities that depend on stable income, hindering the diversity of clinical researchers.

"Research and innovation are not quick and easy pathways to follow. You require funding, the Health Board approval, ethical approval, IG, IT etc., this is even before recruiting patients." - Respiratory & Sleep Physiologist

Few roles exist with NHS Wales that combat this issue for our profession. In NHS England, there is now established a framework and multiple opportunities for these roles, with entry points across all professions[19].

Issues raised also allude to restricted ability to influence and be understood. A lack of understanding to who the Healthcare Science workforce are, and the level of seniority we can possess was a reoccurring theme. More needs be done to ensure Healthcare Science are involved and appropriately represented in research decision making, grant realising panels and multi-organisational innovative networks for NHS Wales. There is a need to develop skills to ensure more reach and feel supported to apply for senior roles.

Finally, the pathway of undertaking innovative work and the tools available appears less structured compared to Wales's research infrastructure. Efforts are being made to enhance standardisation and to set up the required policies and resources for this, but at present, support, training, funding and other processes are not transparent.

Barrier 6 - Inequity:

Whilst the funding, training and support is theoretically available for research activity across all career stages for NHS Healthcare Science professions, issues are still found with access to these. There has been a disparity in research opportunities for healthcare professionals in Wales in comparison to England[8]. Recent efforts have been made to remove barriers that Healthcare Science professions faced due to lack of understanding of the value of the voluntary professional registers. However, exploration still identified several other examples of inequity as summarised below:

Exclusion	NIHRs Reviewer Development Schemes are in place for early researchers to become peer reviewers • These are only open to nurses, midwives and speciality registrars Some opportunities have only recently included Welsh applicants, including the NIHR Invention for Innovation (i4i)
Profession disparity	Examples of good practice: • Audiology NIHR Champions, webinars and Welsh network for research. • Life Science and Clinical Engineering research networks provide support and funding opportunities for these specific professions. Other professions have no infrastructure or support networks for research e.g. Neurophysiology, ODPs. Reliant on individuals to mentor.
Difficult competition	Where awards are available, these are highly competitive with a large audience: • HCRW Advanced Fellowship Award - Open to all researchers in a Welsh institution or organisation. Academic applicants will be more prepared to create competitive grant applications. • NIHR Doctoral Fellowships - Open to anyone (clinical and non-clinical) with a proposed HEI or NHS host • Wellcome PhD fellowships for Health Professionals - Open to all healthcare professionals, social workers and vets
Resource limits	Grants not able to cover fundamental infrastructure costs: • Medical equipment and clinical room/laboratories tied up with clinical work • Equipment and laboratory space could be resourced within universities to undertake research, particularly for diagnostic research

Drives towards inclusivity and high profile research raises the quality of our research. This has gradually led to the replacement of profession-specific grants and NHS-led awards such as HCRW's Research for Patient and Public Benefit Wales (RfPPB), with more widely inclusive opportunities.

One consequence to this is that Healthcare Science professionals, and other NHS-based researchers, face increased competition, particularly against pure academic applicants, without the time or resources to compete. This limits our ability to successfully engage in research and develop early researchers from within NHS Wales.

Barrier 7 - Difficulties with PPI:

Patient and public involvement (PPI) is a required, essential aspect to establishing quality, patient-centred research and innovative change. Whilst many of the Healthcare Science professions have direct contact with their service users, a large proportion are 'non-patient facing'. Research and innovation in highly specialised, scientific laboratory-based work have benefits to service users, but these are indirect, impeding our ability to effectively undertake PPI.

Furthermore, our heavy contribution to diagnostics often means our patient contact is fleating, with few repeat visits, restricting our ability to cultivate relationships with our patients and encourage their engagement with our research. These are particularly important issues to overcome, especially considering that PPI continues to be an important metric for winning grant funding and recognition awards open to healthcare professionals.

Facilitators - 1 Training programmes in the profession:

Research is a core element of all formal education, including within graduate degrees for Radiographers and ODPs and in the accredited Healthcare Science training programmes.

For many, these education and training programmes and routes to registration are milestone stages whereby research skills are developed and individuals are provided with the time and space to think innovatively and lead their own projects; for example those on the Scientist Training Programme are required to be a Principal Investigator on a short masters-level project.

Making use of the skills of trainees and the training provided within these programmes is a crucial enabling factor, not only to increase an individual's leadership skills and proficiency to undertake research and innovation, but also to help make such activities commonplace within services. Where service needs are factored into research project choice, the programmes can be an effective enabler to progress small-scale local research or to build a body of evidence over time through successive trainee projects. Other staff within teams also benefit

with the potential to experience recruiting participants or being researchers on the projects.

It is also important to ensure that these skills are not lost after the training is over. Furthermore, the training programmes and their equivalence routes could be utilised even further to develop innovative projects, creating an alternative for individuals who are more kinetic, practical thinkers.

Facilitators - 2 Equivalence routes to registration:

Equally, the need to undertake original research is also a key part of the equivalence routes to registration. These are enabled by the Academy for Healthcare Science and other professional bodies as a way for those working in the NHS to achieve the different professional registrations available at graduate (Biomedical Scientist, Radiographer, ODP, Healthcare Science Practitioner, Clinical Technologist, Genetic Technologist and more), postgraduate (Clinical Scientist) and doctoral (Higher Specialist Scientist) levels.

In NHS Wales, funding can be applied for to support activities related to equivalence routes to registration including research and innovation training and MRes/PhD fees. As registration is achieved through building a portfolio of evidence, this flexible route enables individuals to map their development needs against the portfolio template and plan activities to both meet service needs and acheive their own career progression.

Facilitators – 3 Intellectual capital:

The knowledge and expertise that we accumulate in niche, highly specialised areas of health science is often incomparable. Our inside knowledge, working at the front-line of healthcare provision, places us perfectly between the industries in healthcare innovation and the clinical practice that results in improved patient outcomes and experiences.

Understanding the value of this and navigating the reversal of 'seller-customer' relationships with our with industrial partnerships is integral to seeking new modes of generating income, IP and developing the necessary infrastructure needed to establish cutting-edge innovation.

Technical and professional abilities are in scarce supply and are a recognised barrier to innovation[20]. This potentially poses Healthcare Science as an untapped resource and key faciliators to developing scalable, impactful healthcare innovations.

Facilitators – 4 Digital advancement:

As Healthcare Science professionals our work is reliant on the equipment available to us. Therefore, advances in technology are key to freeing up our time to undertake research and innovation, which will then in turn, continue the advancement of such technologies. The rise of artificial intelligence and other

digital advancements provides promising hope to cope with the future pressures NHS Wales anticipates in the following years.

The evaluation and widescale investment of this should be a core consideration. Robust NHS data sharing frameworks and enabling digital infrastructure will be key for research and innovation with academic and industry partnership working to secure external investment in research and innovation capacity and capability.

Facilitators – 5 Multi-disciplinary teams:

Because of our role in the healthcare service and our integral role in diagnostics, we often collaborate with many other parts of the NHS Wales workforce. We are already established supporters of research, regardless of our awareness to that fact. Therefore, it should be possible for us, in principle, to move smoothly into more prominent, active research roles, acknowledged within articles and posters, and from there, into growing the principle and chief investigator roles that demonstrate an ability to lead research.

We can achieve this with the support and understanding of our fellow NHS colleagues, and by working together collaboratively, pooling together knowledge and resources. Moreover, our education and training enable us to work together with HEIs. By enhancing these partnerships, we can not only support research and innovation work, but also help increase the visibility of Healthcare Science.

Facilitators – 6 Collaborative forums:

Forums can bring together individuals from Healthcare Science, academia, industry and Welsh Government, and help create the necessary platform for cultivating cross-sector relationships and partnerships. UK-wide, Pan-Wales and regional examples include the Academy of Medical Science forum, the Clinical Academic Training forum (CATF), the Wales Cancer Industry Forum, the Arch Innovation Forum and the Healthcare Science Research and Innovation Working Group.

Such forums provide opportunities for discussion, ideas sharing, multi-professional support and informed strategic planning to exist and tackle healthcare priorities. Active engagement in such forums can help facilitate the securing of investment into Healthcare Science research and infrastructure necessary to create scalable innovative change.

SWOT analysis

Considering this current landscape both within and outside our profession, a SWOT analysis was undertaken to identify strengths, weaknesses, opportunities and threats to increasing our capacity to undertaken research and innovation, as shown below.

Strengths	Weaknesses
1. Our intellectual capital: as Healthcare Science professionals we have developed highly specialised knowledge and expertise. This is of great value if harnessed. 2. Research and scientific inquiry are core elements of our training programmes. 3. We are a disciplined workforce, used to working in an evidence-based approach. 4. We are already great supporters of research (directly and indirectly). 5. National policies recognise our potential as a workforce to research and innovate.	1. We struggle to meet current demand and our time is tied up in operational service delivery. 2. Opportunities are missed because of service pressure, workforce shortages and inability to utilise 'backfill' funding. 3. We are poorly networked and often work in silos. We need a collective voice. 4. Lack of promotional drive - we are commonly not adept at 'selling ourselves' or promoting our intellectual capital. 5. Research and innovation are not universally a part of our culture and there are few leaders in research and innovation available as role models.
Opportunities	**Threats**
1. Welsh Government strategies and frameworks are driven towards developing NHS research and innovation capacity and infrastructure. 2. The potential for digital advancements and artificial intelligence will help address capacity issues if we harness these. 3. NHS Wales initiatives and funding for career advancement, such as equivalence routes to registration and the career pathway to Consultant Clinical Scientist. 4. To work with industry and create a model for sharing our intellectual capital. 5. To take advantage of current opportunities for funding, training, and networking (e.g. HCRW workshops, NIHR support for grant applications).	1. Continual, increasing pressures on our services, with an ageing population and increase prevalence of diseases and long-term health conditions. 2. Competition for grants and funding opportunities against other NHS workforces and academia more experienced as researchers and proficient in grant applications. 3. Funding opportunities favour clinical impact, making laboratory scientist research difficult to pursue. 4. Losing our researchers and innovators to other NHS organisations or industry due to insufficient career progression. 5. We are a poorly understood sector of the NHS workforce and are not yet recognised as lead researchers when compared against our medical colleagues.

Section 3: Recommendations

Strategic Themes

From the information collated, five strategic themes have been identified as recommended to achieve this vision. Case study examples where suchrecommendations are already being made possible are referred to in Appendix 3.

1 - Awareness and Engagement	2 - Training and Leadership	3 - Culture and Adoption
Developing ourselves as key contributors to tackling healthcare priorities	Leading the way in improving healthcare provision	Making research and innovation an essential part of our work

4 - Harnessing and Expanding Opportunities	5 - Translating Research and Innovation
Maximising our potential and our opportunities	Ensuring out research and innovation leads to positive, scalable change

Theme 1: Awareness & engagement

Aim: To successfully grow a Healthcare Science workforce that contributes to tackling healthcare priorities through active research and innovation.

Objectives:

- For all the Healthcare Science workforce to understand the importance and relevance of research and innovation in clinical practice and how this contributes to realising the vision of 'A Healthier Wales'.
- To ensure understanding of how research and innovation fits into career pathways and encourage competitive engagement with opportunities available.
- To raise awareness of Healthcare Science professions as key contributors to the research and innovation landscape.
- To formalise signposting of opportunities and horizon scanning for impactful research and innovation in Healthcare Science.
- To strengthen our partnerships with R&D, industry, academia and research champions as part of achieving the Welsh Government NHS R&D framework[12].

How this will be achieved:

- The whole Healthcare Science profession engaging in widescale dissemination of this strategy and promotion of its messages.
- Use of this strategy as a resource within our Healthcare Science profession: adopting terminology, using career stage skills and activities in personal development reviews, making use of facilitators and sharing case studies.
- Use of this strategy as a resource by other NHS professions and wider stakeholders: engaging with our profession, promoting Healthcare Science clinical academics and clinical researchers, and engaging in collaboration.
- Providers of funding, training and research careers directly engaging with NHS Healthcare Science services, professional bodies and HEIs to raise awareness of opportunities in both the current and future Healthcare Science workforce.
- HCRW and HEIW ensuring that online platforms effectively signpost funding, training and support opportunities in research and innovation of specific relevance to Healthcare Science, and share quality research outputs.
- NHS R&D departments and innovation forums directly working with Healthcare Science services to improve relationships, build understanding, and raise the profile both of our profession and of the invaluable support available.

Theme 2: Training & Leadership

Aim: For our Healthcare Science profession to become leaders in research and catalysts of creative change in NHS practice to improve the outcomes of our patients, our workforce, and our nation.

Objectives:

- To enable implementation of a clear career progression pathway for research and innovation in our Healthcare Science profession.
- To ensure pathways into senior leadership roles within NHS organisations and equitable access to roles in key bodies such as HCRW
- To work with key enabling organisations (e.g. HCRW, R&D, HEIs) to facilitate mentorship, training, support networks and leadership opportunities needed for novice researchers and innovators to develop the necessary skills to become leading researchers and innovators.
- To implement Healthcare Science clinical researcher and clinical academic roles as key to engagement, signposting and support of early researchers.

How this will be achieved:

- Strengthening our links with enabling organisations and working together to co-create mentorship and training schemes inclusive of and targeted at Healthcare Science professionals.
- Ensuring mentorship schemes follow a pan-Wales, uniform approach, avoiding unnecessary duplication and inequities across professions.
- Monitoring the impact of training and mentorship schemes, to further identify barriers within the research and innovation career pathways and prioritise focus areas of improvement.
- Introducing requirements to have Healthcare Science representation on government-run research funding panels and in forums/strategic groups for which our roles play a vital part.
- Having active Healthcare Science representation at the Health and Care Research Wales Communications Alliance.
- Implementing a clear relationship between profession leads (EDoTHS), professional networks (e.g. NHS Executive, professional bodies) and strategic advisory groups (WSAC) to set priorities, agendas and align resources through peer groups and executive teams in a more ‘one Wales’ approach.
- Reviewing in more detail the current landscape for clinical academics within Healthcare Science to help inform delivery plans and to help strengthen our relationship with academia.
- Health Boards/Trusts and HEIs creating clinical researcher and clinical academic roles within each profession, providing clear roles of leadership in research and clear links between services and local R&D departments.

Theme 3: Culture & Adoption

Aim: To make research and innovation an essential part of our work and to align workforce planning with this.

Objectives:

- To establish research and innovation activities as an integral and protected aspect of job planning for Healthcare Science professionals.
- To ensure research and innovation becomes a cultural norm, included within workforce transformation and planning.
- To initiate and strengthen a research culture in less research-active specialities of our Healthcare Science profession.
- To ensure that research resources are accessible and available to the Healthcare Science profession.
- To cultivate an environment of psychological safety that promotes scientific inquiry and exploration across all levels of a Healthcare Science career.
- To recognise and raise the profile of key role models leading R&I and to enable networking opportunities for novice researchers and innovators to take inspiration and guidance from their more experienced colleagues.
- To ensure buy in from management and our fellow healthcare professionals working closely with us to establish research and innovation as day-to-day practice, and to enhance the impact of such work via collaboration across multi-disciplinary teams.

How this will be achieved:

- EDoTHS spearheading the implementation of flexible, bespoke job plans within the Healthcare Science profession, ensuring ringfenced time for research and innovation.
- Workforce Planning leads in health boards and trusts recognising and factoring in research activity within IMTPs and workforce planning.
- Healthcare Science services stablishing and nurturing commercial partnerships which can help provide semi-predictable capital that can sustainably facilitate research and innovation and help tackle workforce issues.
- Working together and with academia to form an organised, well-connected community of researchers and innovators for all career levels, focusing on shared interests and encouraging collaboration and the sharing of experiences, ideas, and advice.
- Working with NHS Wales Library Service, local Health Boards and Trusts to facilitate easy access to journal papers for all Healthcare Science professionals.

- All managers encouraging and supporting our Healthcare Science workforce in the continuation of research and innovation beyond competency milestones.
- Embedding Equality, Diversity and Inclusion (EDI) into our research culture, with engaged effort to include under-represented groups within patient and public involvement (PPI) throughout the research process and support the use of Welsh language.
- Continuing to undertake research that addresses healthcare inequalities and encourages diversity within our workforce.
- Advocating for more leadership roles for Healthcare Science professionals (e.g. Clinical Director of Healthcare Science, Professional Lead of Radiography) that can provide a voice for the ongoing needs of the profession, including those mentioned within this strategy.
- Actively engaging in forums and multi-disciplinary teams to demonstrate our ability to contribute and lead in research and innovation work.

Theme 4: Harnessing and expanding opportunities

Aim: To maximise our potential, take smart choices and avoid missed opportunities

Objectives:

- To facilitate national monitoring, dissemination and collaboration of research and innovation across Healthcare Science in Wales.
- To further review equality of access to opportunities and work with key funders of research and innovation in Wales to create accessible, equitable opportunities for Healthcare Science, with particular consideration towards our less 'research active' workforce.
- To strengthen our networking within and across professions to establish a collective voice, support each other, share in learning experiences, and avoid duplication of work.
- To encourage innovation work to be considered equivalent to research work in our training programmes and their equivalence routes to registration, to develop a workforce proficient in entrepreneurship

How this will be achieved:

- Establishing and facilitating the automatic, mandatory capture of profession-specific research activity so that we can more accurately record Healthcare Science research involvement.
- Engaging in discussions around potential inequities in opportunities with funders and enablers of research to establish underlying causes, raising awareness and playing an active role in suitable, sustainable solutions.
- Creating, continuing and monitoring carefully considered development opportunities specific to Healthcare Science, to acquire skills and gain

knowledge that can help inform innovative change. A recent example of this is the Healthcare Science Programme Service Transformation Fellowship21.

- Creating Healthcare Science specific research and innovation grant opportunities, available to all specialties within our profession.
- Raising awareness of current key opportunities to disseminate work and engage in awards and cross-speciality conferences both locally and nationally.
- Collaborating across Health Boards, Trusts and specialties (in and outside of Healthcare Science) to defragment the current landscape and align our existing resources against grant challenges.
- Working with National School for Healthcare Science, academia, Academy for Healthcare Science and professional bodies to explore ways of enhancing the innovation arm of training curricular and equivalence portfolio criteria.

Theme 5: Translating research and innovation

Aim: To develop the necessary infrastructure for translational research and scalable, innovative change to clinical practice.

Objectives:

- To establish an awareness of our own intellectual capital and develop the entrepreneurial skills needed to market our knowledge and expertise appropriately.
- To establish and strengthen partnerships with industry and enter decisions over our intellectual capital, helping to maximise our potential to influence the wider innovation landscape and to enable spread and scale of novel technologies and innovative pathways that improve patient experience and outcome.
- To disseminate research and innovative work both nationally and internationally, demonstrating capabilities to not only undertake the work, but to impactfully promote it.
- To gain the support of managers and other NHS colleagues from the start, making them aware of the work early on to prevent avoidable hold-ups and reduce administrative hurdles, and to enable effective translation into NHS improvement and transformation.

How this will be achieved:

- Scoping, developing and accessing ways for our workforce within NHS Wales to develop their entrepreneurial skills; such examples include Cancer Research UK's Entrepreneurial Programmes or the NHS Clinical Entrepreneur Programme.

- Engaging in conversations with industry to market ourselves as ‘field experts’ and negotiate mutually beneficial relationships, working together for the betterment of healthcare provision.
- Enabling open access publishing for research that showcases Healthcare Science professionals in Wales are leading the way in innovating thinking and transformational change.
- Ensuring our research aligns with current local needs and national healthcare priorities such as sustainability and value-based healthcare, sharing our findings, successes and next steps with our colleagues and managers to encourage buy-in.
- Ensuring our research and any innovative changes we develop and implement considers our population demographic, positioning patient and person-centred equality, diversity and inclusion should be at the heart of everything we do, including our research.

Next steps

Following the publication of this strategy, further collaboration and commitment is required to develop a thorough delivery plan, and a monitoring, evaluation and learning framework. Such work will be led by Healthcare Science, in particular the Healthcare Science Research and Innovation Working Group. This will be facilitated by HEIW, with oversight from key stakeholders such as the Healthcare Science Network, Healthcare Science Programme Board, HCRW and Welsh Government.

Realising the vision set out in this strategy is reliant on the cultivation and strengthening of partnerships with HCRW, NIHR, HEIs and other key stakeholders such as charitable and commercial organisations.

Timely response from our profession and all stakeholders is integral to success of the strategy. Advantage must be taken of the current, up-to-date information provided in the context of a constantly changing research and innovation landscape, and ever-increasing demands in our health service. We therefore advocate the following timeline.

Aligning our work with HCRW:

These recommendations have been carefully considered, not only to increase research and innovation activity within NHS Wales, but also to focus on building the necessary infrastructure to recognise these as core pillars of practice, with longevity and sustainability at the forefront.

Many of these recommendations align with those outlined in HCRW's 'Making research careers work'[8], however, with specific consideration here to Healthcare Science profession-led research. Appendix 4 outlines the relationship of these recommendations to those described by HCRW in order to help integrate and align our delivery plans.

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Useful Contacts:

HCRW- Healthandcareresearch@wales.nhs.uk

HEIW Healthcare Science Programme- HEIW.HCS@wales.nhs.uk

NIHR- https://www.nihr.ac.uk/about-us/contact-us/contact-us.htm

NHS Wales R&D contacts:

- Aneurin Bevan University Health Board- ABB.R&D@wales.nhs.uk
- Betsi Cadwaladr University Health Board- BCU.Research&Development@wales.nhs.uk
- Cardiff & Vale University Health Board- Research.Development@wales.nhs.uk
- Cwm Taf Morgannwg University Health Board- CTMUHB_RD@wales.nhs.uk
- Hywel Dda University Health Board- HDd.Research-Development@wales.nhs.uk
- Powys Teaching Health Board- Bright.IdeasPowys@wales.nhs.uk
- Public Health Wales NHS Trust- PHW.Research@wales.nhs.uk
- Swansea Bay University Health Board- SBU.RANDD@wales.nhs.uk
- Velindre University NHS Trust- Velindre.R&DOffice@wales.nhs.uk
- Welsh Ambulance Service NHS Trust- AMB_Research.Development@wales.nhs.uk
- Welsh Blood Service- WBS.Research@wales.nhs.uk

Innovation support organisations in Wales:

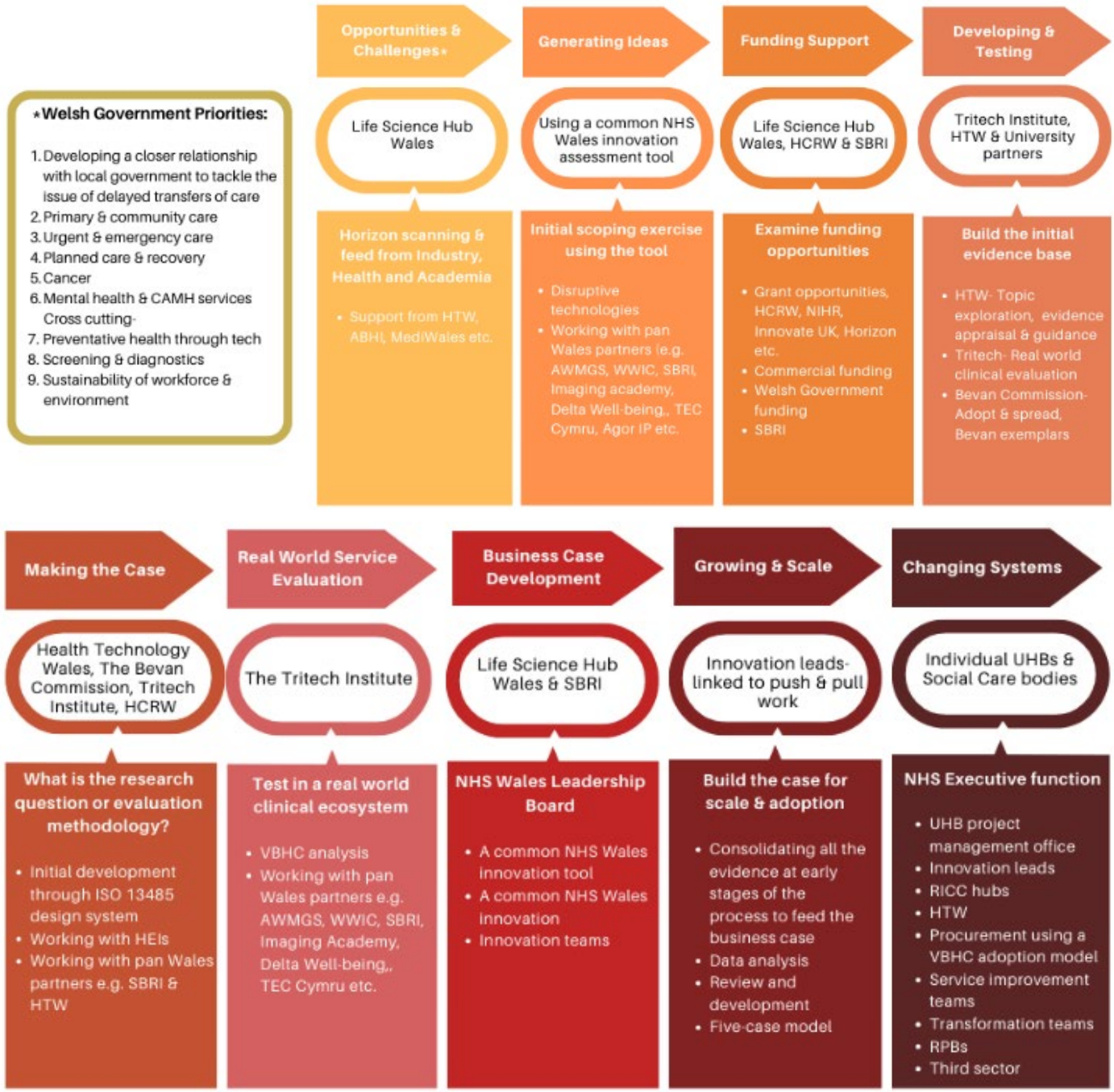
- The Small Business Research Initiative (SBRI)- sbri@lgcgroup.com
- Health Technology Wales- healthtechnology@wales.nhs.uk
- The Tritech Institute- Tritech.HDD@wales.nhs.uk
- Life Science Hub Wales- hello@lshubwales.com
- Tec Cymru- teccymru@wales.nhs.uk
- MediWales- https://mediwales.com/contact

Appendices

Appendix 1: Innovation Process Wales

Innovation Process Wales

(Any technology or model of care in health and social care that isn't a medicine)



Professor Chris Hopkins, June 2023

Appendix 2: Opportunities for NHS Wales Healthcare Science Professionals at pre-doctoral, early researcher level

Note that this list is not exhaustive of all available opportunities and that there are further funding streams and opportunities once individuals are successful funding holders

HEIW

- Funding available for training and education (e.g., MSc/MRes) towards Advanced Practitioner development, or to enable healthcare science registration.
- Healthcare Science Innovation fellowship – Mentoring, bursary and access to education platform for a one year innovation project.

R&D Depts

- Local support and advice on research careers, design analysis, bid writing, etc.
- May offer free face to face or online training e.g., PI workshops.

HCRW

- Emerging Researcher Scheme – 0.4 WTE salary for 2 years £5000 for research NHS and social care.
- Research Training Award – 0.2 WTE salary tuition fees for M level degree relevant to research (full/parti time) NHS, social care, independent H&D sector.
- Pre-doctoral fellowship – M-level tuition or funds for additional support and training.
- Free face to face or online training e.g., PI workshops.
- Many more research funding opportunities including cross-funder awards e.g., with Stroke Association.

NIHR

- Pre-doctoral fellowship – M-level tuition or funds for additional support and training.
- Pre-application support fund – up to £20,000 funding for training, conferences, salary, and mentorship for 12 months to prepare for an NIHR application.
- Free online e-learning and supportive resources.
- Associate PI scheme to help support researchers to lead projects.

RCBC

- First into research fellowship – 0.2 WTE for 12 months supervision, training, research, and travel costs <£12,500.

The Bevan Commission

- Bevan Fellows – Networking and support with local practice innovation.

- Planned Care Innovation Programme – Support for larger scale innovative change to providing value-based healthcare including implementing new roles.

Dragon's Heart Institute

- Climb Programme – 10-month training programme in innovative leadership.
- Spread and Scale Academy – 3-day intensive team training course on refining innovative improvement and scaling up change.

HEI's

- Various MRes, MCs/MA by research.
- Courses such as the Value-based Health and Care Executive Education short course (ILA sponsored).
- Support from academics/clinical academics.

SBRI

- Pre-competition, in-competition, in-portfolio and impact workshops and drop-in clinics for support with innovation projects.
- Specific funding awards are available (e.g. NHS Cancer Programme Innovation) but only for innovation at clinical sites in England.

The Tritech Institute

- Advice and support available with grant submissions, study sponsorship, research study design and more.
- Innovation assessment and adoption tool- supporting innovators to assess the potential ease of adoption and potential value of the innovation.

Improvement Cymru

- Online and in person training on quality improvement for all levels.
- Toolkit guides on a variety of QI aspects including spread and scale, to support individuals to lead projects.

Innovate UK

- A variety of different types of funding available including fellowships such as the Future Leaders Fellowship- for early career researchers and innovators looking to transition to independence and develop plans within a commercial setting. Funds 80% of economic costs for up to 4 years, including salary support.

The Health Foundation

- Funding for training and fellowship awards, including the Generation Q programme, where fellows can obtain a PgCert in Leadership (Quality improvement), with the option to go on and complete the MSc over 2 years (travel and accommodation costs included).
- Online guides, toolkits, and webinars on a range of improvement, research, leadership and much more.

Appendix 3: Case Studies

Research into Practice:

The All Wales Medical Genomics Service (AWMGS) is a key example demonstrating award-winning, pioneering research and innovation with their QuicDNA project, pioneering a quicker, less invasive approach to diagnosing lung cancer. Collaborating with Health Boards, HCRW and LSHB, in addition to forming industry partnerships with Illumina, Amgen, Bayer and more.

This work showcases our potential to maximise on opportunities and develop cutting-edge technologies, epitomising how Healthcare Science can lead the way to achieving a healthier Wales through research and innovation.

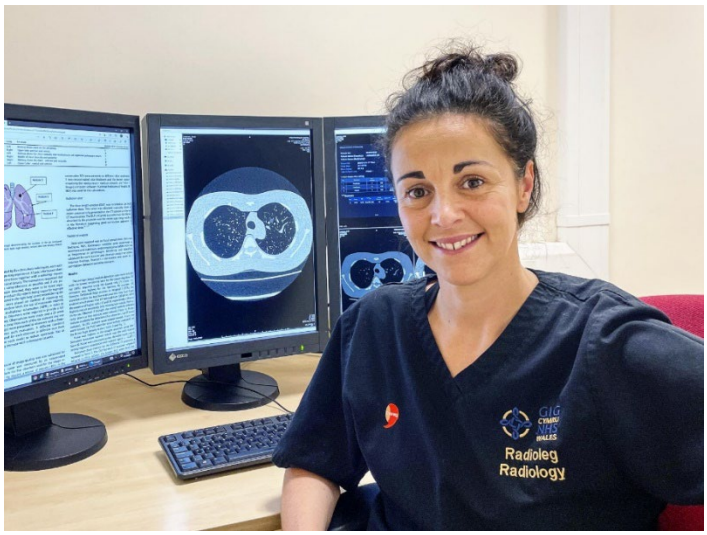
Clinical Academic roles:

Dr Emma Rees is Associate Professor of Healthcare Science (Swansea University) and Clinical Scientist (Swansea Bay University Health Board). Emma is considered a pioneer in her profession, forging a new career path as a leader of clinical research.

After several years of clinical experience, Emma took a role at Swansea University which allowed her to pursue clinical and academic work. Since completing her PhD at the Wales Heart Research Institute, Emma has developed a portfolio of funded research and innovation which explores how point-of-care ultrasound can improve patient pathways and outcomes.

Her work is built on close engagement with stakeholders, from patients to policy makers. Emma has also built a dedicated echocardiography lab in the university's Health and Wellbeing Academy. The lab supports NHS services, clinical trials, and education for healthcare professionals. Emma is a strong advocate for clinical academic roles and is passionate about mentoring others to lead high quality research that benefits patients and healthcare systems.

Clinical Researcher Roles:



Dr Jenna Tugwell-Allsup is one of two research radiographers based at BCUHB, a role that is fairly unique in Wales.

Jenna leads her own research projects, facilitates and mentors the research of others and plays an important role both locally as chair of R&D meetings, audit and quality improvement lead and honorary lecturer at Bangor University, and nationally as a member of the Society of Radiographers Research Advisory Group, the International Advisory Board for Radiography Journal and the Healthcare Science Research and Innovation Group (RIG).

Jenna's role provides a bridge between the worlds of research and clinical practice, key to encouraging and supporting research across the radiography professional and inter-professionally, whilst also providing the necessary dedicated time to undertake research underpinning clinical practice, with her research activity and projects in last 2 years surrounding artificial intelligence local validation.

Leading and supporting innovative healthcare solutions:

TriTech Institute is a venture by Hywel Dda University Health Board offering specific services in innovative healthcare solutions comprising of industry-leading engineers, scientists, pharmacists, nurses and medics.

Led by Professor Chris Hopkins, a Consultant Clinical Scientist, the Tritech Institute offers a single point of access to NHS and academic experts, a regional testbed, and an agile and efficient approach.

The team make it easier to develop, test, and evaluate innovative technologies to improve their viability, including their contributions to patient outcomes, and support companies to thrive and create high quality jobs and growth.

Negotiating for research and workforce capacity:

The Neurophysiology service at Cardiff & Vale University Health Board have transformed a collaborative research opportunity into a forward thinking, capacity building venture. Their collaborative research work with other services such as Ophthalmology and Intensive Care has strengthened cross-specialty relationships and raised the profile of this essential service.

Demonstrating entrepreneurial skill and a dedication to service transformation, they successfully secured funding from these partner services for new equipment and additional staff, allowing the continuation of this important research, and helping to address wider issues of workforce capacity.

Demonstrating patient-centred innovation:

Dr Jonathan Howard is a rehabilitation engineer in Swansea Bay University Health Board who recently underwent HEIW's associate innovation fellowship, a programme funded by HEIW, providing access to Devices for Dignity (D4D) online training platform and events.

His work focuses on the co-design and creation of simple but effective, bespoke products that aid individuals with upper limb limitations to perform everyday tasks that many of us take for granted.

This ingenuity and forward thinking continues to positively impact the lives of his patients and has recently won him an NHS Wales Innovation Fellowship with HEIW to continue this work.

Workforce solutions and research:

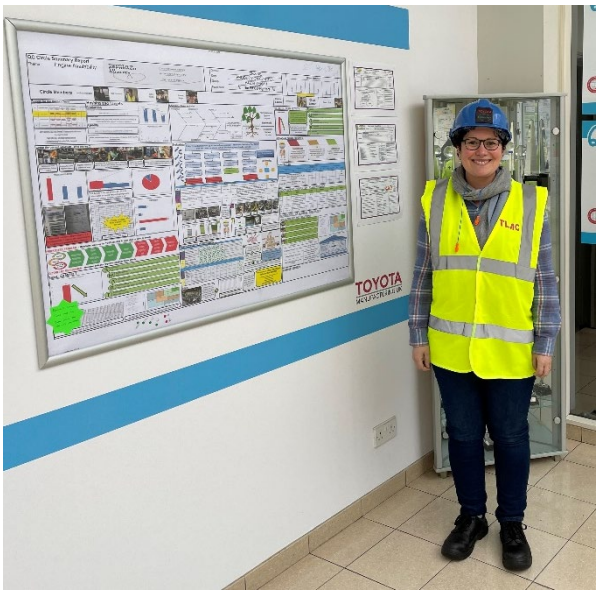
Dr Chris Earing, Respiratory Physiologist provides a prime example of how research can provide a potential solution to workforce issues. Whilst undertaking his doctorate as a Sport Science fellow at Bangor University, Chris investigated the ventilatory response to hypercapnia in scuba divers and obstructive sleep apnoea in patients.

This led to developing practical skills within a multi-disciplinary clinical team at Betsi Cadwaladr University Hospital and the decision to become a Health Science professional. Chris continued his keen interest, promoting a research culture within his department and supporting another PhD student who also became a practicing Physiologist.

In addition to this, Chris also chairs the Clinical Physiologist Scientific Committee, helping to network Physiologists across Wales, and has recently taken up a Clinical Academic position, lecturing at Wrexham University.

Collaborating with industry:

Francesca Lewis, Radiotherapist and now MSCC coordinator for the recently formed South Wales Spinal Network was awarded the RCBC First into Research fellowship in 2023.



After being inspired by a talk from Toyota at an Improvement Cymru conference, Fran was able to immerse herself in the carmaker's innovative culture by spending 3 days at the Toyota factory in Deeside, North Wales, organised by Improvement Cymru and hosted by Toyota.

Building a relationship with Toyota, Fran then decided to start her journey in research, exploring how NHS services within Wales can learn from Toyota's successful Kaizen culture, adopting a culture of constant improvement, with an environment that supports innovation.

Since starting this work, Fran gave an inspiring TED-style talk at HCRW's annual conference and plans to continue her research within her new role at Swansea Bay University Health Board, continuing her partnership with Toyota. Fran provides a prime example of how strengthening our relationships with industry can pave the way for new learning and new solutions to futureproofing our NHS.

Networks of research:

The Welsh Audiology Research Network (WARN) brings together interested and established researchers across all career levels within Audiology. Together, the network has developed its own research strategy for Wales and hosts an annual meeting for Audiology researchers across Wales to present and share their work.

This work establishes strengthen collaboration across Health Boards and provides early, aspiring researchers with visible, accessible role models and potential mentors.

Senior roles in supporting research:

Professor John Geen is a Consultant Clinical Biochemist and the Assistant Director for R&D at Cwm Taf Morgannwg University Health Board. John has Visiting and Honorary Professorships at the University of South Wales (in Clinical Science) and Cardiff Metropolitan University (in Clinical Biochemistry) respectively.

Professor Geen has been instrumental in raising the profile of Healthcare Science and providing the necessary voice for our workforce at key strategic meetings, helping shape policy on research with HCRW and Welsh Government. John provides a key example of how Healthcare Science professionals can thrive in senior research roles, helping to steer the necessary strategic changes to increase research awareness, opportunities and capacity.

John, as a strong advocate of clinical research and healthcare science, continues to highlight the important role of healthcare scientists in research, as primary researchers and research leaders, and through our contribution to the research of other clinical, non-clinical and academic colleagues. He is a pillar of support for early researchers from all professions and continues to bridge the gap between clinical services, R&D, academia and Welsh Government.

Appendix 4: Relationship to HCRW recommendations[8]

HCRW Recommendations	How these relate to the Healthcare Science R&I Strategy actions
Strategy, funding & leadership	
1. Develop a clear, structured, visible research career pathway for all health and social care disciplines, across all sectors and at all stages of careers.	- Use of this strategy as a resource within our Healthcare Science profession: adopting terminology, using career stage skills and activities in personal development reviews, making use of facilitators and sharing case studies. - Use of this strategy as a resource by other NHS professions and wider stakeholders: engaging with our profession, promoting Healthcare Science clinical academics and clinical researchers, and engaging in collaboration.
2. Invest more funding in research careers, to fill identified funding gaps in Wales, whilst quantifying the scale of disparity of funding opportunities for researchers across the UK, to enable the levelling up of investment.	- Engaging in discussions around potential inequities in opportunities with funders and enablers of research to establish underlying causes, raising awareness and playing an active role in suitable, sustainable solutions. - Creating Healthcare Science specific research and innovation grant opportunities, available to all specialties within our profession.
3. Review, assess and address the need for research capacity building and research career pathways in social care research in Wales, while addressing the disparity of opportunity between health and social care research.	- Creating, continuing and monitoring carefully considered development opportunities specific to Healthcare Science, to acquire skills and gain knowledge that can help inform innovative change.
4. Health and Care Research Wales to develop a joint strategy and implementation plan… for enhancing research careers in Wales which is overseen by an implementation group, including a vision for developing research capacity and capability among health and social care professionals.	- Introducing requirements to have Healthcare Science representation on government-run research funding panels and in forums/strategic groups for which our roles play a vital part. - Having active Healthcare Science representation at the Health and Care Research Wales Communications Alliance.

HCRW Recommendations	How these relate to the Healthcare Science R&I Strategy actions
5. Health and Care Research Wales, Health Education and Improvement Wales and Social Care Wales should work together to support the enhancement of research careers through a collaborative leadership approach.	- Collaborating across Health Boards, Trusts and specialties to defragment the current landscape and align our existing resources against grant challenges. - Working together and with academia to form an organised, well-connected community of researchers and innovators for all career levels, focusing on shared interests and encouraging collaboration and the sharing of experiences, ideas, and advice.
6. Health and Care Research Wales should invest in a high-level leadership role to lead this area of work, raising the profile of research careers, co-ordinating national developments, Wales wide collaborations with key partners and facilitating UK wide collaboration.	- Providers of funding, training and research careers directly engaging with NHS Healthcare Science services, professional bodies and HEIs to raise awareness of opportunities in both the current and future Healthcare Science workforce. - HCRW and HEIW ensuring that online platforms effectively signpost funding, training and support opportunities in research and innovation of specific relevance to Healthcare Science, and share quality research outputs.
7. Continue to collaborate with UK wide funding partners, including government funding partners, research councils and charities to ensure training and development opportunities for Welsh researchers, enabling cross funder investment where appropriate.	- Healthcare Science services establishing and nurturing commercial partnerships which can help provide semi-predictable capital that can sustainably facilitate research and innovation and help tackle workforce issues.
Infrastructure	
8. Create an all Wales service to provide a package of support, guidance and training for health and social care researchers in developing their research careers for example through an integrated Health and Care Research Wales Faculty.	- Strengthening our links with enabling organisations and working together to co-create mentorship and training schemes inclusive of and targeted at Healthcare Science professionals.
9. Review the research mentorship schemes across Wales, with a view to enhancing the provision of mentorship schemes for researchers and developing a	- Ensuring mentorship schemes follow a pan-Wales, uniform approach, avoiding unnecessary duplication and inequities across professions.

HCRW Recommendations	How these relate to the Healthcare Science R&I Strategy actions
standardised framework as part of a unified all-Wales approach.	- Monitoring the impact of training and mentorship schemes, to further identify barriers within the research and innovation career pathways and prioritise focus areas of improvement.
10. Enable co-ordination of support for research careers across Wales, as well as enhanced collaboration amongst key stakeholders and infrastructure groups, to facilitate the development of research careers through a shared responsibility.	- Implementing a clear relationship between profession leads (EDoTHS), professional networks (e.g. NHS Executive, professional bodies) and strategic advisory groups (WSAC) to set priorities, agendas and align resources through peer groups and executive teams in a more 'one Wales' approach. - Advocating for more leadership roles for Healthcare Science professionals (e.g. Clinical Director of Healthcare Science, Professional Lead of Radiography) that can provide a voice for the ongoing needs of the profession, including those mentioned within this strategy.
Culture & ecosystem	
11. Work with professional bodies and UK wide partners to consider opportunities for integrating research into professional training from an early stage.	- Working with National School for Healthcare Science, academia, Academy for Healthcare Science and professional bodies to explore ways of enhancing the innovation arm of training curricular and equivalence portfolio criteria.
12. Explore mechanisms for supporting NHS organisations and local authorities to embed research into their strategies for staff recruitment and retention, and workforce development planning, enabling the development of a nurturing research environment for health and social care professionals.	- The whole Healthcare Science profession engaging in widescale dissemination of this strategy and promotion of its messages. - All managers encouraging and supporting our Healthcare Science workforce in the continuation of research and innovation beyond competency milestones. - NHS R&D departments and innovation forums directly working with Healthcare Science services to improve relationships, build understanding, and raise the profile both of our profession and of the invaluable support available. - Workforce Planning leads in health boards and trusts recognising and factoring in

HCRW Recommendations	How these relate to the Healthcare Science R&I Strategy actions
	research activity within IMTPs and workforce planning.
13. Support NHS organisations and local authorities to invest in support for research careers, investing in researcher development, protected time for their researchers, research leadership posts and exploring clinical/ practice academic posts.	- EDoTHS spearheading the implementation of flexible, bespoke job plans within the Healthcare Science profession, ensuring ringfenced time for research and innovation. - Working with NHS Wales Library Service, local Health Boards and Trusts to facilitate access to relevant journals for all Healthcare Science professionals. - Health Boards/Trusts and HEIs creating clinical researcher and clinical academic roles within each profession, providing clear roles of leadership in research and clear links between services and local R&D departments.
14. Work with universities to identify gaps in academic leadership, opportunities for joint clinical/ practice academic posts and explore solutions to enable longer term, secure employment opportunities for researchers.	- Reviewing in more detail the current landscape for clinical academics within Healthcare Science to help inform delivery plans and to help strengthen our relationship with academia.
Communications & engagement	
15. Develop a unique selling point for research careers in Wales as a vehicle to attract and retain researchers, for example, focussing on a nurturing environment for researchers.	- Enabling open access publishing for research that showcases Healthcare Science professionals in Wales are leading the way in innovating thinking and transformational change.
16. Develop a programme of work to raise awareness and the profile of research amongst health and social care professionals, their employing organisations and the regulators, promoting research careers in Wales, particularly in underdeveloped areas.	- Raising awareness of current key opportunities to disseminate work and engage in awards and cross-speciality conferences both locally and nationally. - Actively engaging in forums and multi-disciplinary teams to demonstrate our ability to contribute and lead in research and innovation work.

HCRW Recommendations	How these relate to the Healthcare Science R&I Strategy actions
17. Develop plans to monitor equality, diversity and inclusion data amongst the researcher population, publishing data reports and action plans to help facilitate the equal representation of all groups in the Welsh researcher population.	- Establishing and facilitating the automatic, mandatory capture of profession-specific research activity so that we can more accurately record Healthcare Science research involvement. - Embedding Equality, Diversity and Inclusion (EDI) into our research culture, with engaged effort to include under-represented groups within patient and public involvement (PPI) throughout the research process and support the use of Welsh language. - Continuing to undertake research that addresses healthcare inequalities and encourages diversity within our workforce.