Health Education England

The Physiological Sciences Workforce in the Midlands: Current and Future Challenges

A Report produced for Health Education England and NHS England/NHS Improvement

Completed by Leigh Griffin July 2021

Contents

Forewood

1/ Physiological Sciences and Physiological Scientists are central to the delivery of many critical NHS services. Despite this truism, however, they remain poorly understood and under appreciated by many service leaders and planners. Whilst the prime purpose of this report is to review current and projected workforce needs and challenges across the Midlands region, it also provides a timely opportunity to highlight and promote the role of Physiological Scientists.

2/ The Physiological Sciences have been impacted by the Covid pandemic in many ways, direct and indirect. Services have been reduced and efficiencies affected by social distancing and PPE requirements, whilst many staff have found themselves redeployed to other service areas. However, this has often demonstrated the flexibility and adaptability of the Scientist workforce, and the value of multiskilling. As we now begin to address service recovery, delivery requirements are being increased at a time when many staff are exhausted and remain anxious, whilst deferred or latent demand from patients materialises.

3/ Recruitment to roles, career progression and retention all present challenges within many systems, whilst the scope for expanded practice is being differentially realised. The purpose of this report is to shine a light on these issues and variances, whilst also looking forward to future opportunities and challenges. Recommendations to address current challenges and meet future opportunities are presented, hopefully providing a basis for the necessary service change and growth and building a platform for a fuller understanding and appreciation of these critical services and staff.

4/ Thanks are extended to the many people who gave of their time and expertise to inform this report. In particular, the tremendous support provided by the Regional Chief Scientists, Peter Bill (West Midlands) and Claire Greaves (East Midlands), by Nighat Hussain at NHS England and Dr. Martin Allen, National
Advisor for Physiological Sciences has been particularly appreciated. Needless to say, any errors or misunderstanding in this report are entirely of the author's own making.

5/ This report was commissioned by Health Education England in 2021 as part of a suite of workforce reviews specifically addressing the sustainable delivery of diagnostic services. From the outset NHSE/I has demonstrated strong interest and support in the report's development through close working with Regional Lead Scientists and enabling connection to national work and thinking with regard to the Physiological Sciences.

Summary of Reccommendations

6/ Physiological Scientists provide expertise and unique skills which complement (and, in some instances, can substitute) those of other clinicians to enable and enhance the diagnosis and management of disease. Scientist skills and perspectives enable the diversity of clinical expertise and strengthen team working to the benefit of patient outcomes. At the more senior levels, the enhanced skills and scope of practice of Scientists complements and supports medical leadership, often in hard-pressed specialties, as already exampled in a number of areas. This can support service recovery post-pandemic and service change and transformation.

7/ The further development of Physiological Sciences is fuelled by expectations with regard to the development of Community Diagnostic Hubs over the next five years. The anticipated inclusion of a significant level of Cardiac Physiology, Respiratory and Sleep services within these Hubs, and the probable inclusion of other services such as Audiology and Urodynamics will require urgent consideration and investment in expansion of the workforce.

8/ It is extremely challenging to project the number of Physiological Scientists needed in 2, 5 or 10 years' time. Drivers for increase include: -

- The impact of demographic change, which will continue to increase demand for cardiac diagnosis and procedures, for respiratory services, audiology – it is projected that 1 in 4 people will have some degree of hearing loss by 2031 – and ophthalmic and vision services;
- Presentations of increasing, repressed and unmet needs (e.g, Respiratory demand post-pandemic, unmet or ill-met demand for audiology);
- Current delays in diagnosis and treatment, particularly in areas with a limited scientific presence – e.g., GI and Urodynamics services;
- Post-pandemic backlogs in diagnostic and treatment services – e.g., new-born hearing assessments, echocardiography;
- Growing evidence, albeit with variable take-up, regarding the scope for advanced scientific practice in easing pressures on medical consultants – e.g., developments in Neurophysiology, Cardiophysiology;
- Changing service delivery models – in particular the rapid development of remote testing and monitoring and the emergence of Community Diagnostic Hubs;
- Technological change such as AI/machine learning for reporting.

The above all combine to signal the need for steady growth. With the additional expansion of Scientists into areas such as Gastrointestinal Physiology and Urodynamics, it is realistic to estimate a need for an increase of 275 fte qualified Physiological Scientists by 2026/27 from a current baseline of 1253 fte.

9/ In order to support the continuing development of physiological sciences, as part of the broader body of Healthcare Sciences, it is recommended that: -

a) Recommendations with regard to the development of Physiological Sciences

Recommendation 1

In order to effectively deliver service recovery and enable the full development of Community Diagnostic Hubs, it is recommended that Integrated Care Partnerships and Boards give early consideration to the value, need and potential of physiological sciences and fully involve lead scientists in their planning – Paras 11 and 145.

Recommendation 2

It is recommended that all Trusts review the most recent ESR coding guidance and ensure that all Physiological Scientist posts are correctly coded – Para 26.

Recommendation 3

It is recommended that all services are staffed and rostered at levels which avoid the need for service delivery to stop at times of staff annual leave – Para 34.

Recommendation 4

It is recommended that Health and Well-being support should be available to all Healthcare Science staff, aligned to an understanding of their needs and anxieties – Para 36.

Recommendation 5

It is recommended that Lead Scientists fully support the Midlands-led development of a Business Intelligence system in order to establish a consistent process for activity reporting and future benchmarking – Para 39.

Recommendation 6

It is recommended that national priority is given to the extension of the echocardiography PGC pilot programme and to the increased capacity of Cardiophysiology STP and HSST programmes – Para 47.

Recommendation 7

It is recommended that systems and trusts give early consideration to the current and projected workload pressures in Cardiophysiology and Respiratory (including Sleep) services, considering rising demand and the planned provision of these services in Community Diagnostic Hubs. These need to be supported by an assessment of the scope for any efficiencies, an increase in workforce numbers and an expansion of STP and HSST intake numbers – Para 57.

Recommendation 8

It is recommended that particular consideration is given to the planned development of respiratory and sleep services, consistent with recommendations made in Mike Richards' 2020 report on Diagnostics. This is likely to require greater STP and PTP training opportunities and the possible integration of services with Cardiopulmonary services – Para 58.

Recommendation 9

It is recommended that consideration is given to the extension of Vascular Science STP training programmes, aligned to the creation of sub-regional training support – Para 63.

Recommendation 10

It is recommended that systems and trusts consider the value of enhancing scientist roles to support service delivery in Gastrointestinal and Urodynamics services, possibly in conjunction with developments in endoscopy services and the development of Community Diagnostic Hubs – Para 65.

Recommendation 11

It is recommended that Audiology service leads liaise to provide a clear and consistent service statement as to the explicit role and value of NHS Audiology as opposed to independent sector audiology, with a focus on advanced practice opportunities. Liaison with primary care is strengthened to ascertain levels of unmet need, whilst the impact of the pandemic on hearing consultations, particularly for children, needs to be given further, urgent attention – Para 79.

Recommendation 12

It is recommended that the NHS nationally reviews the nature of its service offer in Audiology in the context of increasing need, current unmet (and undiagnosed) need, the role of the independent sector and opportunities for future cross-sectoral working – Para 80.

Recommendation 13

It is recommended that an audit of advanced practice in Physiological Science services is undertaken to inform how and where, and with what clinical governance and training arrangements, the expansion of practice can assist in the delivery of hard-pressed services across the region - Para 91.

Recommendation 14

It is recommended that ophthalmic and vision scientists provide a clear description of the additionality provided by scientists in this field, and that all service and pathway reviews of Ophthalmic services access the skills and advice of a qualified Ophthalmic or Vision scientist – Para 94.

Recommendation 15

In summary, it is recommended that the number of fte qualified Physiological Scientists should increase from the 31/3/2021 regional baseline by:

- Cardiophysiology – 130
- Respiratory and Sleep – 50
- Vascular – 15
- GI/Urodynamics – 10
- Audiology - 30
- Neurophysiology - 30
- Ophthalmic and Vision Science - 10

(Paras 45,59,63,67,81,90 and 95)

Recommendation 16

It is recommended that all systems and trusts supporting the training and supervision of scientists should receive a training levy – Para 103.

Recommendation 17

It is recommended that Physiological Sciences fully access and utilise opportunities for the training of apprentices to enable the successful development of Practitioners and Scientists – Para 107.

Recommendation 18

It is recommended that, sub-regionally, funded cohorts of Physiological Scientists are established as a matter of some urgency, with funding of posts covering the period of initial qualification and two-years post-qualification. This would build experience across different systems and provide a recruitment pipeline - Para 111.

Recommendation 19

It is recommended that prompt action is taken to establish sub-regional networks and academies for Healthcare Science, akin to those proposed for imaging. This would enable coordination and collaboration of training, recruitment and benchmarking, the share and spread of best practice and extended practice and the promotion of research and innovation – Para 116.

Recommendation 20

It is recommended that Practice Educator posts are established to coordinate and support training across the sub-regional networks – Para 118.

Recommendation 21

It is recommended that a region-wide mandate for registration (AHCS/HCPC) is developed as a requirement for clinical practice, supplemented with professional body affiliation to enable greater standardisation of practice– Para 131.

Recommendation 22

It is recommended that the role of Physiological Sciences in the restoration and recovery of services should be identified and promoted by Scientists. Opportunities for accessing additional support (e.g., from trust access to Elective Recovery Funding) should be identified and pursued – Para 138.

b) Recommendations with regard to leadership in Healthcare Sciences

Recommendation 23

It is recommended that all Integrated Care Systems and Trusts liaise to designate Lead Scientist roles as professional leads with clear role descriptions, and that these individuals are given the necessary time and opportunity to advise on the role and development of Healthcare Scientists in service change and transformation. Typically, the role of Lead Scientist will have responsibilities for oversight and advice at Trust and System level for Healthcare Science staff, including Physiological Sciences. Regional Lead Scientists are available to advise on role descriptions and will provide region-wide leadership – Para 120.

Recommendation 24

It is recommended that Trusts consider how best to secure the advice of their Lead Scientist within their management structures. In a handful of Trusts, the voice and advice of the Lead Scientist is secured at Boardroom Executive level. In some it is through an extended corporate Management team; - most typically it will be secured at Divisional level, where the role of the Lead Scientist can be supplemented by service-specific scientific input - Para 121.

Recommendation 25

It is recommended that systems and trusts actively involve Lead Scientists in the planning of all related services, and specifically in the development of Community Diagnostic Hubs where Physiological Science diagnostics beyond those described nationally in CDH design may benefit from community delivery – Para 122.

Recommendation 26

It is recommended that Lead Scientists establish and maintain regular contact with all Healthcare Science service leads including Physiological Sciences. This is critical in maintaining oversight and an effective advisory and supporting role. This is particularly important for smaller, and more potentially isolated groups – Para 123.

Recommendation 27

It is recommended that Lead Scientists should actively engage in regional and sub-regional engagement with peers and support the development of networks – Para 124.

Recommendation 28

It is recommended that Lead Scientists work with Trust HR leads to establish and maintain an understanding of the Science workforce, and also establish and maintain a good understanding of the local Independent Sector and the scope for collaboration – Para 125.

Recommendation 29

For those trusts which employ a considerable number of Physiological Scientists across several services, it is recommended that consideration is given to the creation of Consultant Lead Scientist roles, with a particular remit for professional advice, the service workforce and its wellbeing and the progression of advanced practice – Para 126.

Recommendation 30

It is recommended that there is a planned movement to enable all physiological science service leads to have protected time built into their job roles to enable their input into research, CPD, audit and networking – Para 128.

c) Recommendations with regard to making the case for Healthcare Sciences

Recommendation 31

It is recommended that healthcare scientists increasingly apply the techniques of workforce planning, business planning and network development with full rigour in order to advise and influence most effectively. A greater focus on return on investment and the enhancement of service quality and safety will provide greater influence and voice to the sciences, identifying priority areas and opportunities for development which are seen as cost-effective – Para 147.

Physiological Sciences – An Overview

10/ Physiological Sciences are one of the recognised groupings of Healthcare Sciences, commonly grouped with Life and Physical Sciences, such as Laboratory (Pathology) Sciences, Medical Physics and Clinical Engineering, and Bioinformatics. Whilst this report solely focuses on Physiological Sciences, a number of its recommendations apply equally to other Healthcare Sciences, whilst recommendations relating to the role of the Lead Scientist encompass all Healthcare Sciences.

11/ Despite the critical dependence of services on Healthcare Sciences, it is disappointing to note the limited attention this workforce has received in STP/ICS workforce plans. This report seeks to promote the role of Physiological Scientists in particular to inform system-based plans. It is recommended that Integrated Care Partnerships and Boards liaise with providers to give early consideration of the value, need and potential of physiological sciences and fully involve lead scientists in the planning of services.

12/ Physiological Scientists (or Healthcare Scientists) work directly with patients to study the way the human body works, examining the functioning of organs and body systems in order to diagnose and support the management of abnormalities and disease. They use specialist equipment and techniques to measure and evaluate the functioning of body systems (e.g., hearing) and organs (e.g., the heart, the brain), capturing detailed data and often using advanced mathematics and analytics to diagnose, plan treatment and monitor the effects of treatment. As such, Healthcare Scientists within this division of science form a critical part of the team of professionals delivering patient care.

13/ At the outset, it should be noted that Scientists work extremely closely with all clinical staff, including in specialties where medical staffing is hard to recruit to (e.g., Neurophysiology). The role and extended practice of the most highly qualified and experienced Scientists can therefore be critical to the delivery of effective medical care and the development of services.

14/ Physiological Sciences is itself an umbrella term for a group of specialisms. Nationally these now comprise: -

- Audiology
- Autonomic neuromuscular function
- Cardiac Physiology
- Clinical Perfusion Science
- Critical Care Science
- Gastrointestinal Physiology
- Neurophysiology
- Ophthalmic and Vision Science
- Respiratory Physiology
- Urodynamic Science
- Vascular Science

15/ Certain of the above services (Autonomic Neurovascular, Critical Care and Clinical Perfusion) have only recently been identified as specialisms in their own right by NHS England. For these specialisms, staffing information via the Electronic Staffing Record (ESR) and Trust structures and returns rarely provide detail, encompassing any staff who work in such areas within more established categories. There are also a very small number of staff whose job titles specify Physiological Measurement, but these are captured under ESR as either Cardiac, Vascular, Respiratory or Sleep Scientists or Neurosensory Scientists.

16/ In reviewing the workforce needs of Physiological Sciences, whilst the UK- wide education and training strategy, 'Modernising Scientific Careers' (MSC) standardised training and career development, different professional bodies have their own distinct approaches – e.g., cardiac perfusionists have their own specific training programme. Also, different bodies take differing approaches to assess the equivalence of experience to qualifications.

17/ Whilst there is scope and value in greater consistency in registration and regulation requirements, the practice of physiological science also needs to continually change, to accommodate policy initiatives such as the emergence of Community Diagnostic Hubs as part of supporting care closer to home, to embed technological changes and to embrace digital innovation.

18/ This study has also revealed marked differences in the extent to which there is close communication at Trust level between the different sciences. There is also variability in the nomenclature and positioning within Trust structures of senior roles. Some Trusts appear to have no formal role of Lead Scientist, whilst
elsewhere this can be a nominal role or a role with funding for leadership.

19/ Some service leads reported little or no contact with or awareness of their Trust Lead Scientist, whilst in other Trusts the Lead Scientist has a clear overview of and close connection with the component service leads (the remit of Lead Scientists typically covers the whole of Healthcare Science).

20/ Furthermore, it is concerning to receive comments indicating that this is the first time certain service leads have been asked for workforce planning information. This is often accompanied with an expression of delight at the attention being given to Physiological Sciences, and a statement that these services feel undervalued and under appreciated.

21/ There are clear career pathways and education and training programmes in a common framework for the vast majority of the NHS scientific workforce. Four main training programmes are in place: -

- Associate/Assistant – to undertake task-based roles under appropriate supervision, to typically work at AfC bands 2-4.
- Practitioner Training Programme (PTP) – an undergraduate degree course enabling an individual to be a practitioner, typically at AFC Band 5, with opportunities then available to develop extended scope practice and/or progress to become a qualified Scientist through the STP. The first two years of training are broad scientific training, with an increased focus on a chosen specialism in year three. This can either be direct entry for non-NHS employees seeking a career in healthcare sciences or through apprenticeship support from the NHS. Qualification brings the opportunity to apply for professional registration which, for Physiological Scientists, is with the Academy for Healthcare Science (AHCS).

• Scientist Training Programme (STP) – a postgraduate, predominantly workplace-based qualification leading to an MSc. This is NHS funded, and accessible to providers registered with the National School of Health Care Science (NSHCS). Training is salary supported, making these attractive career choices, with an annual national application scheme which attracts many more applicants than places available. Trainee clinical scientists train at Band 6 level, and qualified clinical scientists are generally appointed at Band 7. There are also separate in-service STP training routes as well as 'equivalence' routes, enabling experience to flex training requirements. Training opportunities are also available for direct entry graduates, with salary paid by the NHS.

• Higher Specialist Scientific Training (HSST) – doctoral-level workplace training for staff in post, typically over a 4-5 year period, resulting in eligibility to gain a place on the Higher Scientific Specialist register and fellowship with appropriate professional bodies (e.g., the Academy for Healthcare Science - FAHCS), deemed to be equivalent to medical consultant training and enabling progression to the most senior grades.

22/ The framework of the Healthcare Science career framework is summarised below: -

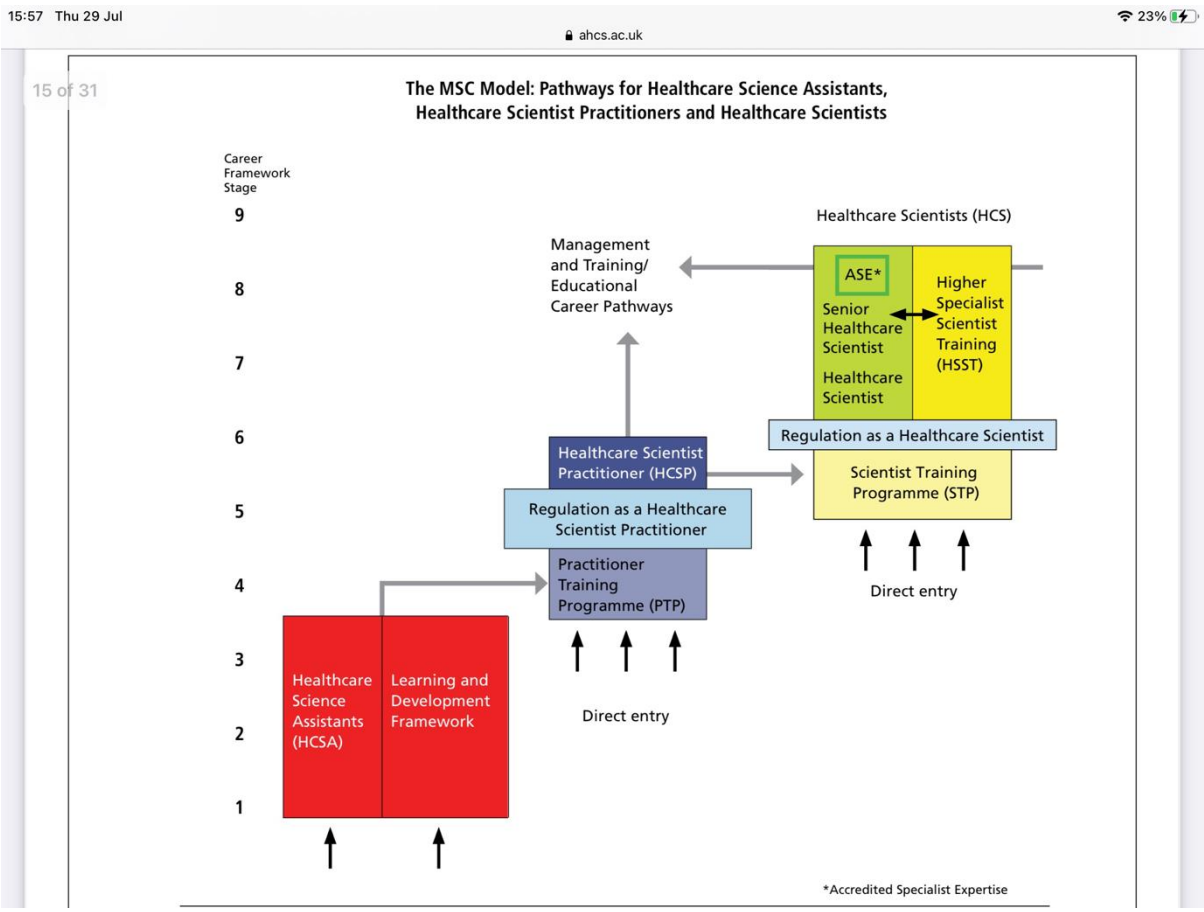

Figure 1: A diagram showing the model of Scientist career progression – from 'Modernising Scientific Careers' as explained in previous text.

Current Service Provision Across the Midlands

23/ Analysis of the Physiological Science workforce is largely structured by the groupings used by the Electronic Staffing Register (ESR) and by Trust organisational design. ESR data uses only the three categories of: -

- Cardiac, Vascular, Respiratory and Sleep Sciences (Cardiac Physiology, Respiratory Physiology incl. Sleep Science, Vascular Science)
- Neurosensory Sciences (Audiology, Neurophysiology, Ophthalmic and Vision Science)
- Gastrointestinal and Urodynamic Sciences (Gastrointestinal Physiology, Urodynamic Science)

24/ Roles coded as Psychological Scientists include both qualified roles – i.e., those regulated as a Healthcare Science Practitioner (typically A&C Band 5 and above, with a degree or equivalence) and non-qualified roles (Healthcare Science Assistants or Associates).

25/ There is some uncertainty across trusts as to whether the more junior, unqualified roles are always coded against Physiological Sciences, with at least two trusts signalling that such roles may instead be coded as Health Care Assistants and not included in Physiological Science numbers. For this reason, the bulk of analysis in this report focuses on qualified staff, albeit with consideration and recommendations as to the criticality of unqualified (as well as clerical) support and the importance of recruitment and development of such roles.

26/ As an aside, individual discussions with trusts suggest that most unqualified posts are correctly coded, and any under reporting may not be significant. It is **recommended** that all trusts review the most recent ESR coding guidance and ensure that all Healthcare Scientists are correctly coded.

27/ The ESR codes used to determine the total number of Physiological Scientists are shown in Figure 2: -

Figure 2: A table showing Occupational codes used for Physiological Sciences as explained in previous text

U		Life Sciences				Physiological Sciences			Physiological Sciences & Biomedical Engineering		Clinical Bioinformatics	Public Health Services	
		Blood Sciences	Infection Sciences	Cellular Sciences	Genetics	Cardiac, Vascular, Respiratory and Sleep Sciences	Neurosensory Sciences	Gastrointestinal & Urodynamic Sciences	Medical Physics	Clinical Engineering	Clinical Bioinformatics	Social Sciences	Environmental Sciences
		A	B	C	D	E	F	G	H	J	K	L	M
Qualified Healthcare Science & Public Health Scientific Staff													
Consultant Healthcare Scientist	UA												
Manager (see notes 1-3)	U0												
Specialist Healthcare Scientist	U1												
Healthcare Scientist	U2												
Specialist Healthcare Science Practitioner	U3												
Healthcare Science Practitioner	U4												

Support to Qualified Healthcare Science & Public Health Scientific Staff													
Healthcare Science Associate	U5												
Trainee Healthcare Scientist	U6												
Trainee Healthcare Science Practitioner	U7												
Trainee Healthcare Science Associate	U8												
Healthcare Science Assistant	U9												
Area of Work Choices Covering Healthcare Science and Public Health Science Specialisms		Blood Transfusion Clinical Biochemistry Haematology Histocompatibility & Immunogenetics Immunology Phlebotomy Point of Care Testing Pathology Toxicology Blood Sciences	Decontamination Science Medical Microbiology Medical Virology Pathology Infection Sciences	Anatomical Pathology Cervical Cytology Cytopathology Electron Microscopy Histopathology Reproductive Science Pathology Cellular Sciences Tissue Banking	Clinical Genetics Genetic Counselling Pathology	Autonomic Science Cardiac Physiology Clinical Perfusion Critical Care Respiratory Physiology Sleep Physiology Vascular Science Cardiac, Vascular, Respiratory & Sleep Sciences	Audiological Science Neurophysiology Ophthalmic & Vision Science Neurosensory Science	Gastrointestinal Physiology Urodynamics Gastrointestinal & Urodynamic Sciences	Angiography Breast Screening Clinical Pharmaceutical Science Clinical Radiology CT Dental & Maxillofacial Radiology Diagnostic & Interventional Radiology Imaging Mammography Medical Illustration MRI Non-ionising Radiation Nuclear Medicine Radiation Safety Radiotherapy Physics Radiopharmacy Ultrasound Medical Physics	Clinical Measurement Medical Equipment Management Maxillofacial Prosthetics Medical Engineering Design Radiation Engineering Reconstructive Science Rehabilitation Engineering Renal Technology Clinical Engineering	Clinical Engineering Genomics Health Informatics Science Medical Physics Clinical Bioinformatics	Nutritional Sciences Behavioural Sciences Field Epidemiology Social Sciences	Radiation Safety Radiation Sciences Toxicology Environmental Sciences

28/ In summary, key findings from ESR data as of 31 March 2021 are as follows:

- There were 2060 employees coded as Physiological Scientists working across the region, comprising 1775 full-time equivalents (fte);
- Of the above, there were 1253 qualified Physiological Scientists. These were deployed as follows:
  - Cardiac, Vascular, Respiratory and Sleep Sciences – 714 FTE
  - GI and Urodynamics – 6 FTE
  - Neurosensory Sciences - 533 FTE
- The region has a population of c10.5M, so there are roughly 119 fte qualified Physiological Scientists per million catchment population;
- The majority of these staff work, in order of service size, in:
  - Cardiac Physiology (incl. Cardiac Perfusion) – most Trusts
  - Audiology – most Trusts
  - Respiratory and Sleep Services – many Trusts
  - Neurophysiology – larger/specialist Trusts only, providing to other trusts
  - Vascular Sciences – some Trusts, providing to other trusts
- There are very few Scientists working in the field of Gastrophysiology and Urodynamics and in Vision Sciences. These services are typically led by other clinicians, with limited Scientist input;
- 8 Trusts individually employ over 100 Healthcare Scientists;
- The single largest employers are:
  - University Hospitals Birmingham NHS FT
  - University Hospitals of Leicester NHST
  - Nottingham University Hospitals NHST
  - Sandwell and West Birmingham Hospitals NHST
  - University Hospitals of North Midlands NHST
- Some Trusts provide certain services to others (e.g, Vascular Sciences);
- A total of 24 Trusts report that they employ Healthcare Scientists;
- 1 in 8 staff (12%) are aged 55 or over, and therefore likely to be approaching or contemplating retirement (however, the societal assumption of retirement at traditional ages is rapidly changing). 10.5% of qualified staff are aged 55 or over.
- 40% of all staff are aged under 35.

- Whilst there are some coding shortcomings, approximately a quarter of all qualified Physiological Scientists are of other non-white ethnic origin. For Neurosensory scientists, this proportion is 30%.
- Sickness levels are typically below Trust average levels, whilst annual turnover rates average c7.5-8%, as compared to the national target 11%. This suggests a more settled, stable workforce, albeit one that deserves more attention and is increasingly under pressure by the demands of service recovery, unsociable hours rotas and overtime commitments. People typically stay within Healthcare Sciences for the majority or all of their career.
- 15% of qualified staff working in Cardiac Physiology and Respiratory services are employed at AfC Band 8a or above, with c37% at Band 7. The equivalent figures for those working in Audiology and Neurophysiology are 11% and 23%. This may reflect market forces for shortage occupations such as echo, whilst also the configuration of Audiology services lends itself to the greater use of lower banded staff. These findings appear to be consistent with findings in the East of England, which indicated a proportionately higher number of support staff in the neurosensory sciences.

29/ Whilst recognising the possibility of errors in coding, discussions with Trusts have confirmed that there are very few Physiological Scientists working in Gastrophysiology and Urodynamics. In part this reflects the fact that not all Trusts may provide these services, but in the main it reflects that services may either be nurse-led (Urodynamics) or covered through medical leadership. This figure is consistent with findings in the East of England, where only 4 NHS scientists were identified as providing Gastrointestinal work in 2020. It does appear to suggest scope for greater scientist support to service delivery in these areas and the development of a more diverse professional workforce with professional leadership.

30/ It should be emphasised that ESR data does not capture information on vacancies or dependence on bank staff. Where these have been identified as key issues, they are highlighted below in the service-specific analysis.

Current Service Issues

31/ The above summary provided a framework from which to approach individual providers as employers of Healthcare Scientists. These approaches sought confirmation or amendments to the summary information accessed, greater detail as to current workforce arrangements, identification of any current challenges and frustrations and views on anticipated challenges over the next few years.

32/ Responses received, and subsequent discussions have helped form a strong understanding of the current workforce, identifying key concerns and future challenges, enabling a number of recommendations to be made.

33/ From returns received, and discussions held, it appears that the ESR figures appear to present a good reflection of the size and composition of the workforce, although the limitations of the service groupings used by ESR means that important information relating to smaller groups is diluted. Moreover, ESR data does not identify current vacancies or spend on bank staff/overtime, etc. The level of vacancies varies considerably between providers: - whilst several cover these with semi-permanent use of Bank staff, the level of unfilled vacancies can often exceed 10%, particularly in some of the Trusts away from conurbations (e.g., Cardiophysiology at Worcestershire, Lincolnshire and Sherwood Forest, Audiology at SaTh).

34/ A number of service managers stated that they have to reduce service provision during times of annual leave, particularly in the less-staffed services such as Respiratory and Sleep Sciences. In terms of service provision and delivery of patient needs, this is unacceptable. It is **recommended** that all services are staffed and rostered at levels which avoid the need for service closure at times of staff annual leave.

35/ Added to the challenge of vacancies, there appears to have been an uptake in maternity leave through the pandemic. In addition, there is a strain on the qualified workforce where staff/apprentices/trainees require time for day or block release and (often considerable) supervision. These pressures are particularly felt at a period when service efficiency is still constrained by the
impact of the pandemic and as latent or suppressed demand is being realised, as is the effect of long Covid. This is a significant constraint on training capacity.

36/ There is no doubt that staff have 'gone the extra mile' through the pandemic, adjusting working routines and, in many cases, being deployed to support critical and intensive care management. Many are still undertaking overtime or bank work at weekends to help manage recovery and demand. Whilst changed practice, including a marked increase in remote monitoring in some areas, will undoubtedly demonstrate the flexibility and potential of physiological scientists to support transformational change, the impact of the pandemic and its aftermath on the health and well-being of staff and in the nature of patient presentations must be both understood and addressed. It is **recommended** that Health and Well-being support should be offered to all Healthcare Science staff, aligned to an understanding of their needs and anxieties.

Benchmarking

37/ Whilst broad information can be obtained from ESR returns regarding staffing numbers, and there is much qualitative information about pressures and pinch points, there is as yet no consistent or formal mechanism for activity collection or benchmarking the performance of Physiological Sciences, making comparisons and the generation of demand and capacity models difficult.

38/ Whilst recognising the difficulties in establishing a clear basis for data collection, this is a shortcoming which must be filled if Physiological Sciences aspire to have a stronger voice in service and workforce planning, and if compelling business cases for additional staff are to be successful. The ability to compare your practice with those of others, to accept challenge and share best practice are integral to the development of Physiological Sciences.

39/ It is with this in mind that the two Lead Regional Scientists in the Midlands have been consulting with colleagues nationally to design and develop a standardised activity recording system. If Physiological Sciences aspire to profoundly influence and shape future developments, and their involvement in such, it is imperative that a means of describing, and benchmarking performance is developed. It is therefore **recommended** that all Physiological Scientists support this initiative to develop and apply standardised means of recording and collating activity data to enable an assessment of performance and the benchmarking of services.

Pathways

40/ Many servcie pathways focus on medical, nursing and AHP roles, often excluding the existence and potential of healthcare sciences, and physiological sciences in particular. As these pathways influence training, service development and workforce planning, it is important that the full diversity and potential of the NHS workforce is reflected and realised.

Specific Services

Cardiophysiology

41/ The largest scientific service and staffing presence in Trusts is almost always the group of services grouped under the term of Cardiac Physiology or cardiophysiology. These services are provided by all acute trusts, with staff carrying out echocardiograms (Cardiophysiologists do over 90% of the echocardiograms performed each year in the NHS), ECGs, and blood pressure management, and also working in catheter labs, supporting procedures including angiograms and angioplasties and pacemaker/ICD implantation, adjustment and recording. Typically, services are grouped together as ECGs, devices and treatments. Clinical Perfusionists appear to be usually included in the staffing numbers for Cardiophysiology.

41/ Whilst detailed information has been secured from several trusts, some did not respond to requests and therefore it can only be estimated that about 500 fte qualified scientific staff work in Cardiophysiology across the Midlands. This equates to about 1 fte per 20,000 catchment population.

42/ Often Cardiophysiologists have an on-call commitment, supporting cardiological practice 24/7. Whilst there has been little evidence of staffing attrition specifically linked to these pressures, on-call requirements doubtless suit some staff more than others, and some may prefer to work in smaller units with less stressful rota responsibilities. There is increasing pressure to do work at weekends, however, with locums being costly and of limited availability. Some providers are beginning to experience high vacancy levels.

43/ Even prior to the pandemic there was evidence of steadily increasing demand for cardiological interventions – particularly echocardiograms (and, to a lesser extent, pacemakers), and scientists are increasingly taking on roles for the reporting of echoes. Echocardiologists are in shortage nationally, highlighting
the scope and need for scientists to work to their licence and supporting the case for extended practice.

44/ The growth in echocardiograms, and the development of Community Diagnostic Hubs to offer more localised diagnostic support further point to the need for the sustained development of Cardiophysiology. Mike Richards' report 'Diagnostics: Recovery and Renewal' (October 2020), adopted by NHSE/I, highlights the 5.7% per annum growth in echoes, and the reduction in activity of
over 50% at the peak of the pandemic, shoring up demand and the probable presentation of more acute heart problems. Trusts report that patients being seen in mid-2021 are presenting with higher levels of acuity and advanced disease, resulting in more device implantation and reduced diagnostic efficiency.

45/ To meet the increasing demand of ECGs and other cardiophysiological procedures associated with demographic change, as well as the relocation of non-acute work to Community Diagnostic Hubs, it is estimated that a further net 130 fte qualified Cardiophysiology scientists will be required across the Midlands by 2027. This represents an increase of c20% over a five-year period, to be supported by an increase in training capacity, and will strengthen both

capacity and leadership. It is anticipated that most if this growth will need to be in A&C Band 7 roles, although non-qualified assistants support will also be required to assist in (e.g.,) the conveyance and support of patients.

46/ Several colleagues have highlighted the value of the pilot Echocardiography Post-Graduate Certificate course: - there would be strong support to the extension of such, similar schemes for those training in heart rhythm management and device management and an increase in cardiophysiology STP and HSST numbers. Additional echo-stimulators will also be required to support an increase in training numbers.

47/ It is recommended that national priority is given to the extension of the echocardiography PGC pilot programme, the creation of similar PGCE programme for heart rhythm management and devices and to an increase in capacity of Cardiophysiology STP and HSST programmes in order to strengthen future leadership and capacity.

Respiratory and Sleep Services

48/ Respiratory and Sleep services are provided by most acute trusts. It is estimated that there are c150 qualified scientists working in these services across the region. Respiratory Science primarily concerns lung function testing and the measurement of airflow, gas transport and blood oxygenation. Advanced practice includes non-invasive ventilation. Sleep scientists focus on sleep breathing disorders, often working alongside nurse specialists.

49/ Having noted the growth in demand for cardiophysiology, there has been an even greater growth in demand for respiratory and, especially, sleep studies. Respiratory and Sleep Science services are provided by most acute trusts, typically with a combined and smaller workforce of anything between 2 and 20 qualified scientific staff staff in total. Not all trusts provide a full sleep service, although it is a rapidly growing discipline, with a number of examples of scientist-led sleep apnoea services. There is increasing recognition of the value of respiratory and sleep services working closely with neurophysiology, particularly in the realm of complex sleep studies.

50/ Many sleep disorders can go unrecognised and untreated, whilst the most severe can benefit from neurophysiological investigation. The British Lung Foundation estimates that Obstructive Sleep Apnoea (OSA) affects 1.5M adults in the UK, with c85% undiagnosed. Undiagnosed OSA is closely associated with a number of serious health conditions, including hypertension, diabetes, stroke and heart disease. Whilst it is hard to capture the scale of increase in the treatment of sleep apnoea, primarily by physiological scientists and nurse specialists, a US study has indicated an increase of 41% in diagnosed OSA between 2013 and 2016 (Acquavella et al., J. Clin. Sleep Med., 2020).

51/ Several Respiratory leads have highlighted the backlog of respiratory diagnostics arising from the pandemic, including sleep studies, pulmonary (lung) function and exercise tests, and spirometry. Alongside this are the realities of a struggle to retain staff (at A&C Band 5 in particular), considerable unmet need and the emergent increase in respiratory illness associated with long Covid, increasing demands on general practice, respiratory physiotherapy, and respiratory science. These demands place particular pressure on small departments.

52/ Some systems have been highly successful in developing sleep diagnostics in primary care (e.g., Warwickshire), whilst the use of monitoring equipment in home settings is increasingly common. Others have driven a rapid enhancement of community-based echo and

spirometry through the pandemic (e.g., Leicestershire), although there is variable confidence in the quality and effectiveness of primary care-led spirometry.

53/ Respiratory Scientists comment on the difficulty of retaining practitioners, particularly away from the conurbations, and at the tendency for staff who undertake the PTP qualification to choose Cardiology as their specialist area of study rather than Respiratory work. This can lead to concerns over the experience and expertise of Respiratory staff, adding to the supervisory demands. This may reflect a perception of better career opportunities in Cardiophysiology, highlighting the need to better market the value of opportunities in Respiratory Medicine, including the scope for extended practice and senior roles.

54/ Mike Richards' report 'Diagnostics: Recovery and Renewal' (2020), adopted in the main as national policy, addresses a number of the above issues in detail, and propounds a case for greater integration between cardio and respiratory work. Recommendation 10 urges that: -

'Staffing surveys should be urgently undertaken for Cardiorespiratory diagnostic services',

whilst Recommendation 15 states: -

'The number of echocardiographers and Clinical Scientists supporting cardiac arrhythmia diagnosis, pulmonary function testing, sleep studies and blood gas analysis should be expanded. Diagnostic professionals who can 'multitask' are required to deliver spirometry, issue sleep studies, ambulatory ECG and blood pressure monitoring, phlebotomy and point of care testing'.

55/ This emphasis on a more flexible, integrated workforce needs to be reflected in training prospectus, and in greater engagement and collaboration between those scientists working in cardiophysiology and respiratory physiology. This fused approach to delivery will require consideration nationally, including by the National School of Healthcare Sciences (NSHCS).

56/ Whilst Mike Richards highlighted the value of inclusion of cardiophysiological, respiratory and sleep services within Community Diagnostic Hubs, discussions are already also extending to the inclusion of Paediatric Respiratory services.

57/ It is recommended that systems and providers give early consideration to the current and projected workload pressures in Cardiophysiology and Respiratory (including Sleep) services, factoring in increasing demand and the planned provision of these services in Community Diagnostic Hubs. This demand needs to be met, where possible, by scoping possible efficiency opportunities and, typically, a planned increase in workforce numbers. These pressures also need to be supported by an expansion in STP intake numbers and funding, the development of networks with practice educators, and the establishment of funded cohorts of trainees.

58/ It is also recommended that particular consideration is given nationally and regionally to the planned development of respiratory and sleep services, possibly, as suggested in Mike Richards' report, integrated with Cardiopulmonary delivery, particularly in CDHs. In addition, greater STP and PTP opportunities and the identification of role models and scope for extended practice and development would all support the development of respiratory and sleep science services.

59/ In summary, it is estimated that the number of respiratory and sleep scientists needs to increase by c50 fte by 2027, reflecting a forward projection of greater demand for these services associated with greater awareness, improved understanding and diagnosis and long Covid, as well as the development of CDHs, within which the scope for more integrated cardiophysiological and respiratory servcies can be explored. Effective integration, as suggested by Sir Mike Richards, would, however, require changes in the national training requirements and the support of the Registration Council for Clinical Physiologists (RCCP) and the Association for Respiratory Technology and Physiology (ARTP). (DN: is this right?)

Vascular Sciences

60/ Vascular Scientists are relatively few in number across the Midlands, typically undertaking ultrasound and other non-invasive tests to image and
assess the blood flow of patients with diseases of the arteries and veins. Specialist vascular scientists are reported in c10 acute trusts in the Midlands, with few Trusts employing more than 10 FTE. Services are often provided by an employing trust to other trusts. Whilst ESR data and trust returns typically include vascular scientists in cardiophysiology data, it is estimated that there are in the region of 50-70 fte qualified vascular scientists across the Midlands.

61/ Most qualified Vascular Scientists work at A&C Band 7, and there are few examples of leadership roles at Band 8a (or above). Leadership in Vascular Science operational management and research is to be encouraged.

62/ Given the small size of departments, there are often challenges in supporting training and supervision, whilst vacancies can cause significant difficulties in service delivery. A number of providers highlighted their concern on the extent of current vacancies, and their dependence on locum posts in the absence of people seeking permanent roles.

63/ It is recommended that consideration is given to the extension of vascular science STP programmes, aligned to the creation of sub-regional training support (see Paras 110-114). There also needs to be a greater acknowledgement and promotion of opportunities in vascular science. A net growth of 15 vascular scientists is estimated to be beneficial over the period to 2027.

Gastrointestinal and Urodynamics Services

64/ Moving onto Gastrointestinal and Urodynamics as a grouping, there are, as has already mentioned previously, very few Scientists employed in these areas (although it has been suggested by one source that some GI work may be classified as Cardiophysiology). As at 31/3/21 there were 6 FTE qualified staff

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across the Midlands, working at only 4 acute trusts. This is because such services are, in the main, nurse and/or radiographer led. With significant waiting times in Urodynamics in particular and with the value inherent in diverse perspectives and more specialised training, there is both value and opportunity in increasing the number of scientists employed in these areas.

65/ Given service demands and pressures in both GI and Urodynamics, it is recommended that systems consider the value of enhancing scientist roles in
these areas, possibly in collaboration with endoscopy services (e.g., in potential collocation in Community Diagnostic Hubs) and as a means of strengthening patient pathways, service capacity and the diversification of skills. Developments at University Hospitals Birmingham,

which include plans for STP training in GI, the appointment of a Urodynamics scientist and the growth in medical referrals to scientists, all signal a way forward for specialist providers. Again, with a view ti experience at Bristol, there is also scope for close working between GI and Urodynamics and scope for an integrated curriculum for master's training, potentially enabled through the addition of an extra module.

66/ As with vascular science, development in these areas should be supported by an increase in STP programmes and greater promotion of the opportunities for scientists in these fields. The appointment of Urodynamic Scientists, for example, can enable Consultant staff to spend less time on fairly basic Urodynamic tests.

67/ It is estimated that considerable value would be accrued from a net increase of 10 GI/Urodynamic scientists over the period to 2027.

Audiology

68/ All those Trusts which employ Physiological Scientists have audiology services. These are typically the second largest group of Physiological Scientists
in Trusts, second in number to Cardiophysiologists. Trusts provide specialist hearing services to new borns, paediatrics and adults, employing between 10 and 60 audiology scientists across the spectrum of qualifications, experience and skills. Across the region it is estimated that there are c300-320 qualified Audiologists.

69/ 1 in 3 adults aged over 65 have significant hearing loss, which brings with it
a significantly greater risk of falls, dementia and emotional ill-health. By 2031 it
estimated that 15M people will have some form of significant hearing loss, whilst 1 in 4 of the population will have a disabling hearing loss by 2050.

70/ This silent epidemic is likely to steadily raise the profile of and need for Audiological diagnosis and support, whether in the High Street or, particularly more specialist services, through NHS support.

71/ Entrance into scientific roles in Audiology is often through a degree in Audiology, such as that offered by Aston University. For many providers this
supply route considerably addresses recruitment issues, although competition
from High Street providers can challenge both recruitment and, in particular, retention.

72/ NHS Audiologists provide a wide range of services for adults and paediatrics, from cochlear implants to new-born hearing screening, from ear wax removal to medical otology. The pandemic has seen the build-up of a significant backlog in new-born hearing tests in particular, whilst there is considerable anecdotal evidence of an increased acuity of cases seen as we emerge from the pandemic. There is real value in the use of Advanced Practitioners to review this backlog in primary care, as is occurring in Wales.

73/ There is a perceived need for Audiologists to work 'to their license' but ensuring that less complex procedures are not carried out by the most senior staff, whilst proactive discussions are often required with ENT consultants to enable Audiologists to develop and apply advanced practice.

74/ There is a common view that Paediatric elements of training courses have steadily reduced in extent, with reference to students completing courses needing considerable in-house mentoring in Paediatric Audiology. This needs to be addressed nationally through curriculum

redesign. At the more senior levels, this would also support the development of advanced practice in Paediatric Audiology, in areas such as medical otology, aural toilet and vestibular assessment and diagnosis.

75/ Several departments comment that they have only been able to address recruitment issues through overseas recruitment from areas including the Philippines, Italy and Portugal, particularly as Bank opportunities have reduced and competition has grown from the private sector. As elsewhere, and will be expanded upon later, apprenticeship opportunities are greatly valued.

76/ There appears to be a degree of stability on staff retention at more senior levels, albeit a steady turnover of new graduates, possibly linked to the greater pay and flexibilities offered by the private sector, which now itself offers a Foundation Degree qualification.

77/ There is reported, however, a considerable shortage of staff required for NHS dewaxing services, where again there is private sector competition. This may signal a need to better highlight the role of the NHS in providing specialist diagnosis and treatment in such areas.

78/ With regard to service restoration and recovery, there have been some impressive achievements across Audiology services. However, there is concern at the reduction in Paediatric referrals through the pandemic for needs such as glue ear, and a sense that there are considerable repressed needs in the community. More generally, there is a strong sense of unmet need for Audiology services, and scope for work across the primary and secondary care sectors to better ascertain need and treatment pathways.

79/ It is recommended that audiology leads liaise to provide a clear service statement as to the explicit role and value of NHS audiology as opposed to private sector audiology, that liaison with primary care is strengthened to ascertain levels of unmet need and that the impact of the pandemic on hearing consultations, particularly for children and young people, is given further, urgent consideration.

80/ It is further recommended that the NHS nationally reviews the nature of its service offer in Audiology, in the context of increasing need, current unmet (and undiagnosed) need, the respective role of the independent sector and the NHS and the opportunities for greater cross-sectoral working.

81/ Subject to the above and taking into account the urgent level of ill-met/deferred and unmet need, it is estimated that there needs to be a net growth of 30 qualified Audiologists over the period to 2027.

Neurophysiology

82/ Neurophysiology involves the study of nerve cells as they receive and transmit information. Neurophysiology scientists work alongside medical Neurophysiologists to diagnose and support the treatment of nervous system disorders, performing EEG (electroencephalography), EP (evoked potentials) and EMG (electromyography) and other procedures to evaluate the function of the brain and nervous system.

83/ About 8-10 Trusts in the Midlands directly provide Neurophysiology services, employing anything between 2 and 30 FTE staff. It is estimated that

there are c140-150 qualified Neurophysiologists working across the Midlands. Typically, and as may be expected, larger trusts perform a broader range of services and more complex services, particularly those which host a Neurosciences Centre. Smaller trusts are often dependent on the support of specialist centres, whilst small departments typically face the challenges of recruitment, retention, training and supervision.

84/ A number of trusts, particularly those which are not tertiary centres, have referred to the need to resort to international recruitment in the face of difficulties recruiting domestically. They also highlight the need for considerable in-house training support for those employed from overseas or qualifying via the STP route, the difficulty in accessing agency staff and the presence of private sector competition.

85/ There is some considerable evidence of long waits for Neurophysiology Nerve Conduction Studies (NCS) and EMG clinics, where demand is increasing. Similarly, referrals for Carpal Tunnel Screening (CTS) are steadily increasing, albeit those referrals are reportedly of highly variable quality.

86/ Scientists working in Neurophysiology have struggled to gain benefit from apprenticeships at undergraduate PDP level due to the small number of Higher Education Institutions (HEIs) offering the course and a rigid delivery model. More recently a couple of HEIs have established their own local PTP apprenticeship courses including distance learning, with some notable success in meeting this poorly met training need. In addition, Neurophysiology scientists have helped to shape a PG certificate course at Aston University, including a focus on EEG and EMG work, which has further supplemented training numbers and provided additional workforce.

87/ There is clear value in effective and close collaboration between Neurophysiologists (Scientist and Medical) and Neurologists. Many trusts
struggle to employ Neurologists and Medical Neurophysiologists, whilst there is growing and compelling evidence of the scope for extended practice in the Neurophysiology scientific workforce. There is therefore a critical need to agree respective roles and means whereby both groups of staff can work most effectively on NHS, and possibly even private sector work.

88/ Examples of neurophysiological scientist advanced practice which can ease
the demands of medical Neurophysiologists, neurologists, and neurosurgeons
include the clinical interpretation of data such as EEG and EP recordings, the
scientist-led intraoperative modelling service and peripheral NCS, complex
upper limb studies and protocol-driven EMG. Subject to the agreement of local clinical governance, this should be encouraged – and, ideally, standardised – as a means of reducing waiting times and improving efficiency. There are centres where initial consultant antipathy to elements of extended practice has been alleviated, although some resistance remains.

89/ More contentiously, there is scope for greater Scientist support to
Peripheral Neurophysiology, assessing nerve and muscle function to detect neuromuscular disease. This involves the stimulation of peripheral nerves using surface electrodes and the recording of muscle activity using fine needle electrodes. There are several examples nationally of scientists safely and competently working within this area of the specialty to the benefit of patients' pathways, although this practice is actively blocked in other areas. Consistency nationally on this issue is required.

90/ Recognising the difficulties in recruiting n Neurophysiologists, and the scope for greater Scientist support to medical practice, it is estimated the the net number of qualified Neurophysiologists across the Midlands should increase by 30 fte by 2027.

91/ It is recommended that, particularly in Neurophysiology Science, but also in Cardiophysiology, Respiratory and other sciences, an audit of extended practice is undertaken to inform how and where, and with what clinical governance, the expansion of practice can assist in the delivery of hard-pressed services.

Ophthalmic and Vision Science

92/ Few trusts directly provide ophthalmic and vision scientists. Services and pathways tend to be medically led, and there is a dearth of scientists: - indeed, this has been the area of physiological science where it has proven most difficult to secure subject matter expert input to this report. It is estimated that there are in the region of 60-70 qualified Ophthamic and Vision scientists working across the region. There are signs, however, of a reduction in medical resistance to the advanced practice of ophthamic and vision science, often associated with your clinicians who welcome opportunities for greater fusion.

93/ The dearth of ophthalmic and vision scientists may be a missed opportunity to develop, implement and retain skills in fields such as visual electrophysiology and enhanced visual screening (provided by some neurophysiology services), imaging and psychophysics, particularly given NHS capacity issues in vision services and the growing demographic demand. Whilst evoked potential services can be led by Neurophysiologists, Nottingham is one of a few centres nationally with a long-standing Ophthalmic scientist-led services.

94/ It is recommended that ophthalmic and vision scientists provide a clear description of the additionality provided by scientists in this field, and that all service and patient pathway reviews of ophthalmic services access the skills and advice of a qualified Ophthalmic or Vision Scientist to provide a specialist scientific perspective and advice.

95/ It is estimated that there is value in increasing the number of qualified Ophthalmic and Vision Scientists across the region by 10 over the period to 2027.

Cross-Cutting issues

a) Training opportunities in Physiological Science

96/ Whilst some service leads clearly look back with some fondness to the period before Modernising Scientific Careers (MSC) given their sense of more rounded basic training and more supply of a funded student intake, the majority clearly welcome the changes introduced by MSC. MSC has offered simplified career structures and a clear career pathway, which, with registration, enhances the status, position and development of physiological scientists as a profession.

97/ There is, however, some concern over the loss of some degree courses, the perceived quality and experience of many completing the PTP programme, the difficulty of securing adequate access to apprenticeship schemes and to the STP programme. In addition, there are perceived ‘logjams’ to development, the risk of loss to the private sector in a number of areas and continuing frustration over the route from Band 7 roles to Consultant Scientist status, including access to STP places.

98/ There is, however, overwhelming support for apprenticeship programmes: - both those which enable entry to unqualified roles and those which are degree-level apprenticeships. Use of the apprenticeship levy by Trusts has enabled them to 'grow their own staff' through effective marketing to local communities and direct support to employed unqualified staff. Whilst the dependence on the levy and staffing establishments to fund and support such training may be constraining, physiological sciences do well, yet could do better, in securing access to and utilising apprenticeship levies.

99/ There is also recognition and support of the introduction of a clinical physiology modelling sports science degree and recognition that sports scientists may prove to be an increasingly attractive pool for recruitment to physiological sciences.

100/ Promotion of career opportunities and apprenticeships in physiological sciences needs to be enhanced in local schools and sixth firm colleges, whilst greater use of social media and national communications would also enhance public knowledge and appreciation of the value of physiological sciences and scientists.

101/ Practitioner-level training is strongly welcomed, notwithstanding the supervisory demands placed on qualified staff. Not all universities provide apprenticeship degree opportunities, and there may be scope for seeking to influence wider and more local availability. Further work may be required to map current course provision more explicitly. There is, however, a particular challenge for small services in influencing HEIs, who may well perceive a lack of financial viability.

102/ Greater use, where possible, of apprenticeship levies would help to address shortages in Band 3/4 and Band 6/7 staff in certain services (e.g., respiratory) and the demands of future growth.

103/ It is recommended that all systems/trusts supporting the training and supervision of scientists should receive a training levy to support backfill.

104/ Level 7 apprenticeship programmes, and the scope for extending such, as well as direct entry to master's degrees (STP) are also welcomed, alongside the extremely competitive in-service opportunities. The STP as a robust means of qualification is highly favoured, accredited under UKAS (the national accreditation body for the UK) and bringing HPTC registration. Equivalence is, however, also welcomed, albeit with a desire for consistency in its application.

106/ Many stated the wish that STP opportunities should be made more widely available (albeit acknowledging the cost of such) as means of developing more qualified scientists. Views were mixed as to the increasing service specialisation typically arising from such, with recognition of the value of the continued development of generic skills and experience alongside specialisation.

105/ The commitment to undertake Ph. D level training to qualify as a Consultant Scientist is considerable, and consistent application of equivalence criteria can provide an alternative for highly experienced staff. Increasingly, however, HSST training is viewed as an integral part of the career pathway embedded under MSC, and a valuable means of enhancing the skill-base of senior scientists, enabling them to 'stretch their licence'.

106/ The strongest views received relate to the value of apprenticeships to grow staff at Bands 3-4 and 5-7 through structured training and qualifications. Specific support was given to the

development of associate scientist apprenticeships in physiological measurement. Faced with current staffing shortages in several areas and projections of increasing demand, it is critical that services maximise the use of apprenticeship opportunities.

107/ It is recommended that Physiological Sciences fully access and utilise opportunities for the training of apprentices to enable the successful development of Practitioners and Scientists.

108/ One suggestion received, noting the constraining effect of apprenticeships to fill and train posts within current staffing establishments, was the creation of one or two regional or sub-regional funded cohorts for Practitioners and Scientists. The creation and funding of a number of 5-year fixed term training posts, with the inclusion of two years post-qualification funding would support the training and development of potential Physiological Scientists at unqualified and degree levels outwith current establishments, particularly supporting the development of cardiophysiology and neurophysiology posts albeit with scope for support to growth in the other sciences.

109/ Training of these cohorts could involve rotational experience between trusts, whilst their retention post-qualification could create a regional 'pool' of staff with protected pay and availability pending their (hopefully) securing permanent posts.

110/ The creation of such cohorts, ideally through new funding in recognition of the growing demand for physiological scientists but otherwise through top slicing of current apprenticeship levies, would provide a consistent supply of new entrants to physiological sciences.

111/ It is recommended that sub-regional funded cohorts of Physiological Scientists are funded and established as a matter of some urgency, with funding covering the period of initial qualification (at both Practitioner and Scientist levels) and two-years post-qualification. This would build experience across different systems and provide a recruitment pipeline.

b) Retention

112/ Whilst physiological sciences don't display widespread retention difficulties, certain services and providers have challenges, a number of which have been highlighted in the body of this report. Attention is drawn to work being undertaken by Michelle Lee and colleagues at NHSE/I regarding retention initiatives across several disciplines, including the sharing of best practice and support to systems seeking to develop retention plans. This work extends to both early and late career staff, analysing NHS leavers by age and identifying agency expenditure associated with the loss of staff. The development of the model hospital tool as 'the model health system' is progressing well and its extension to include scientists should occur in late 2021/22.

c) The development of sub-regional networks and academies

113/ One means by which such training could be better coordinated, and supervision enabled (possibly with some on-cost recognition for participating trusts) would be through the development of sub-regional networks and/or training academies for Healthcare Sciences with appropriately skilled practice educators to identify and respond to emergent training needs. This would enable effective coordination of placements and supervision support for staff on rotational placements (e.g., as required by the STP programmes).

114/ The creation of such networks, consistent to those envisaged for imaging and diagnostics per se, would have a number of clear benefits: -

- Coordination of sub-regional training
- Identification and promulgation of best practice, including remote monitoring
- Identification and promulgation of advanced practice and it's transferability
- Promotion of the roles and opportunities offered by Physiological Science
- Coordination of rates of pay and terms for use of bank staff, insourcing, etc.
- Passporting of staff with transferrable skills to support specific pressure points within and across systems
- Promotion of digitisation and interoperability between providers.

115/ The training responsibilities of networks/academies would be further enhanced by the appointment of appropriately skilled Practice Educators to develop emerging training requirements, without detriment to service delivery, by the establishment and deployment of a training levy to providers.

116/ It is recommended that prompt action is taken to establish sub-regional (East and West Midlands) networks and academies akin to those proposed for
Imaging. This would enable Healthcare Scientists, including Physiological Scientists to collaborate to shape training (through training academies), develop benchmarking, coordinate recruitment, share and spread best practice and promote research and innovation.

117/ It is further recommended that Practice Educator posts are established to coordinate and support training across sub-regions.

d) Leadership in Healthcare Sciences

118/ As already noted in Paragraph 18, there appears to be considerable variation as to the nature, status and impact of the role of Lead Scientist across
trusts. The issue of leadership across the Healthcare Sciences is key if Healthcare Sciences seek to enhance their profile and voice.

119/ Lead Scientists should provide professional leadership and voice to those working in physiological, life and physical sciences, acting as a source of advice for service reviews and planning, and as a conduit to specific specialist scientific support. They will also act as lead links for system-wide, regional and, where appropriate, national engagement, with particular responsibility for supporting network and academy development. They should also act as champions of research across the Physiological Sciences. Job descriptions should recognise and enable the time commitment of such work – e.g., two sessions a week.

120/ It is recommended that all Integrated Care Systems and Trusts confirm the designation of Lead Scientist roles, with clear role descriptions, and that these individuals are given the necessary time and corporate support to deliver this role in support of the development of Healthcare Sciences and Scientists, including the provision of assurances on governance frameworks. In larger trusts, shared roles or designated deputies can provided the required breadth of knowledge. Regional Lead Scientists are available to advise on role descriptions and arrangements to support these post holders.

121/ Lead scientists need to have a voice at relevant decision-making bodies. Systems and providers need to consider how this is best ensured. It is recommended that trusts and systems consider how best to secure the advice of their lead scientist within their management structures. In a handful of trusts
there is access to advice from the Lead Scientist at Board or corporate Management Team level: - more typically it will be secured at Divisional level, where the role of the lead scientist can be supplemented as required by service-specific scientific input.

122/ It is also recommended that systems and providers explicitly involve Lead Scientists in the planning of all related services, including discussions on Diagnostic recovery and the development of Community Diagnostic Hubs. The best means of ensuring this will need to be determined.

123/ In addition, it is recommended that lead scientists should establish and maintain regular contact with all service leads across Physiological, Life and Physical Sciences. This is critical in maintaining oversight and an effective
advisory and supporting role. This is particularly important for smaller, and more potentially isolated groups of staff.

124/ A further recommendation relates to the engagement of Lead Scientists with their peers in other trusts and systems. It is recommended that Lead Scientists actively engage regionally and sub-regionally with peers and actively support the development of networks and networking.

125/ Effective workforce planning requires close working with HR colleagues. It is recommended that Lead Scientists work with HR leads to establish and maintain an understanding of the science workforce. There will also be value in understanding local Independent Sector provision of and access to Healthcare Sciences, and the scope for collaboration.

126/ Finally, for those trusts which employ a considerable number of Physiological Scientists across several services, it is recommended that consideration is given to the creation of Consultant Lead Scientist roles for each service, with a particular remit for professional advice, the service workforce and its wellbeing and the progression of advanced practice through discussion with other clinical leaders.

127/ The importance of effective leadership across Healthcare Sciences cannot be overstated. In terms of the continuing development of Physiological Sciences as patient-facing services, note has already been made of the demands placed on senior staff for supervision of trainees. Whilst it has been recommended that
a training levy is provided to all training organisations to enable this through the provision of backfill, where available, there is also real value in the creation of specific provision in the job descriptions of the most senior Scientists to support R&D and Continuous Professional Development.

128/ Well over 95% of the time commitment of qualified scientists is typically
spent on clinical work, leaving little time for the development of enhanced skills
and advanced practice to enable service delivery, as well as enabling networking and research. It is recommended that there is a planned move to enable all physiological science service leads to have protected time built into their job roles to enable their input into research, CPD, audit and networking.

e) Registration and Regulation

129/ Registration and Regulation arrangements are variable across Physiological Sciences. Greater consistency and standardisation are encouraged and should encompass criteria for the application of equivalence.

130/ Whilst qualification as a Clinical Scientist (whether by STP or equivalence) brings registration with the Health and Care Professions Council (HCPC), this is not a stipulated requirement for the practice of Physiological Science.

131/ It is recommended that national bodies for individual physiological sciences consult with each other and the National School of Health Care Science to establish consistent regulation and registration arrangements.

f) Service Recovery and future challenges and opportunities

132/ Reference has already been made to the existing pressures on staff in many areas, exacerbated by the direct and indirect impact of the pandemic. Similarly, note has been made of the growing demand for many diagnostic tests and the likely level of repressed or unmet need, as well as the effects of long Covid.

133/ In the main, physiological sciences have responded extremely well to the challenges of restoration and recovery. For those services for which data is available, the number of patients waiting for sleep studies has increased across the region from c1000 pre-pandemic to c2200, with c400 patients being seen each week. Equivalent figures for Neurophysiology are c8000 patients waiting (up from c3700, with weekly activity of c1000) and c1000 waiting for Urodynamics (typically nurse-led, and up from c350, with weekly activity of c130). The greatest challenge appears to be waits for echocardiography, where c26000 patients are now waiting, compared to c8000 pre-pandemic, in a service where current weekly activity levels are c2900. In many areas this is being addressed through 7-day working which, with the restricted availability and high
costs of locums, may put an unsustainable strain on staff.

134/ Whilst all of the above signal the need for a steady growth in Scientist numbers, whether exampled in Cardiophysiology (e.g., growing numbers of ECGs, pacemakers, the effects of long Covid), Respiratory (growing demand for sleep studies, the impact of long Covid), Audiology (repressed and unmet needs) or Neurophysiology (increasing service scope). All areas are affected to some extent by demographic change and the resultant increased demand, whilst working at the top of an extending licence will strengthen team working across typically capacity constrained services such as Cardiology, Neurology, ENT and
Ophthalmology. Furthermore, the extension of Physiological support in areas such as Neurophysiology, Vision Sciences and Urodynamics would create a more flexible, diverse range of skills across many critical, hard-pressed areas.

135/ The pandemic has forced and enabled many services to design and adapt at pace to different ways of working. Whilst some of these, associated with social distancing in particular, have adversely affected the efficiency of service delivery through the pandemic, others have transformed delivery to the benefit of patients. Servcie delivery has changed at pace as decision-making processes have been streamlined. In particular, several forms of remote monitoring have spread more quickly to enable non face to face contacts. These range from remote monitoring of CPaP machines through home oximetry to patient-managed spirometry.

136/ Remote monitoring, particularly in Cardiophysiology and Respiratory and Sleep Sciences, and to a lesser but increasing extent in audiology, will enable staff to manage their workloads differently and prioritise patient contacts. There is, as yet, however no evidence that it will reduce staff workloads.

137/ There is also the risk that remote monitoring may exacerbate access inequalities, as these patients who are more confident and 'technologically comfortable' may embrace the new ways of working more readily. The deployment of new technologies and the patients using such need to be closely monitoring to check that they may not be increasing unequal access for certain groups.

138/ It is recommended that the role of Physiological Sciences in the restoration and recovery of services should be identified and promoted by scientists.
Opportunities for accessing additional support (e.g., from Trust access to the Elective Recovery Fund) should be identified and pursued.

g) Community Diagnostics

139/ Over and above all of the above pressures and changes, we are already seeing the first wave of Community Diagnostic Hubs (CDHs) being established. Whilst the first wave focuses on those systems able to develop Hubs with current workforce and estates, future waves are likely to see increasing Independent Sector involvement and more radical changes to models of care, with workforce implications.

140/ It is a policy assumption that CDHs will include Cardiophysiology and respiratory service provision for those with non-acute needs, taking services out of traditional acute settings to non-acute, community settings. As well as housing cardiorespiratory services, consideration will need to be given to their possible delivery of appropriate Neurophysiology, Gastrointestinal, Urodynamic, Audiology and vision science services. Clearly such consideration will need to accommodate workforce considerations, including the scope for and impact of segmenting service provision, where necessary, between acute and non-acute sites, scope for staff rotation to secure skills and experience across different settings, and management models.

141/ It is critical that Healthcare Sciences are involved from the outset in discussion regarding the functions and design of Community Diagnostic Hubs. Their input needs to inform service provision, workforce provision and development and the provision of any necessary capital equipment and estates configuration.

142/ The development of CDHs must not impede the sustainability or development of alternative means of delivering care closer to home, typically involving developments in primary care. Primary care has a particularly significant role in initial diagnosis and referral, as well as in delivering certain tests in accordance with agreed standards (e.g., spirometry).

143/ It is recommended that in order to deliver service recovery and enable the full realisation of the potential of Community Diagnostic Hubs, Integrated Care Systems consider the value, need and potential of physiological services, and fully involve representatives of those services in planning.

h) The Independent Sector – friend or foe?

144/ The Independent Sector may become a major provider of CDHs, and both the NHS and the Independent Sector will need to consider the value of working in collaboration or competition with NHS providers. Arrangements must and will be put in place to ensure appropriate quality standards, monitoring and governance of all CDHs. IQIPS (Improving Quality in Physiological Sciences) accreditation may be one possible means for this.

145/ Whilst the Independent Sector is, in many systems, a long established and valued complementary provider of health services, it's potential further enhancement into CDHs must be reflected in an appropriate commitment to the training of staff. Ideally, this should be reflected in a fair-shares contribution to apprenticeship levies and clinical placements where they seek to work in partnership with the NHS.

i) Integration across Primary and Secondary Care

146/ As well as seeing the rapid development of CDHs, the next few years are likely to see further debate and development across primary and secondary care regarding the most cost-effective way of delivering care. Developments in respiratory and sleep diagnostics and in remote echocardiography have already been noted, noted the extension of remote monitoring may also involve primary care delivery. What is important is that models of delivery are monitored against jointly agreed quality standards, with agreed models of clinical governance.

147/ The physiological sciences also need to embrace the opportunities arising from digital innovation to strengthen connectivity and communication. Again, the establishment of networks is likely to be instrumental in the achievement of this. Whilst the use of remote monitoring has progressed rapidly during the pandemic, other emergent technologies such as the use of AI/machine learning to support reporting, as is being piloted in a number of imaging services, will also be increasingly available to scientists, with probable medium term workforce implications.

Helping Physiological Sciences to Strengthen Their Voice and Influence

148/ It is hard to argue a case for additional staff or service expansion without data. It is **recommended** that, in addition to the active support of the development of improved business intelligence, that scientists actively further develop and use the techniques of workforce planning, business planning and networking with full rigour to advise and influence most effectively. A greater focus on return on investment and the enhancement of quality and safety will provide greater influence and voice to the sciences, identifying priority areas for improvement and opportunities which are demonstrably cost-effective.

Summary

149/ This report hopefully shines some light on the provision of physiological sciences across the Midlands, current pressure-points and future needs and opportunities. If the Region and systems wish to ensure provision of skilled
scientific support to pathways of care, as a critical component of a multi-disciplinary approach across services which are typically capacity constrained and face growing demand, an appreciation of their role must be matched with plans for their growth.

150/ These plans, informed by an understanding of the extent to which Physiologists, working to the top of their licence, can best support medical consultants and changing models of care, needs to enable the further development and recognition of Physiological Sciences, complementary to and enabling medical consultants to work to their licence.

151/ The value of Physiological Sciences will be further supported by increased working across their component service elements, within and across Trusts. Supported by Regional Diagnostic and Scientific leadership, this will be enabled through consistent activity reporting, enabling benchmarking, and the development of system-wide and sub-regional networking.

152/ One final caveat: - as with so many NHS reviews and services, we focus on elements of delivery in isolation at our peril. The need for coordination of service delivery to best meet the holistic needs of these we serve is a challenge for all providers of care. Greater collaboration between physiological services is a small step in the right direction.

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