The Role of the Haematology/Transfusion Consultant Scientist in the Delivery of Clinical and Laboratory Haematology Services: An Education and Training Solution and a Workforce Solution

National School of Healthcare Science
Haematology Workforce Working Group

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Executive Summary

Purpose of the report

Haematology is a diverse and complex clinical and laboratory specialism comprising a wide range of multi-professional roles and expertise. The report aims to identify 'service gaps' that medically qualified consultant haematologists have been unable to fulfil because of recruitment issues, gaps in specialist expertise issues or workload pressures. The report has been researched and written by a 'task and finish group' of scientifically and medically qualified haematologists (a sub-group of the Haematology Workforce Working Group of the National School for Healthcare Science (NSHCS) in Health Education England (HEE)). It forms part of a larger report to be presented to the joint NHSEI and HEE's Pathology subgroup which is part of the larger diagnostic group in HEE/NHSEandI.

What is known from published sources

The British Society for Haematology (BSH) published a haematology workforce report in 2019[1] which provided a detailed analysis of staff resource issues in haematology and set the scene for the need for a strategic workforce review. The Royal College of Pathologists (RCPath) produced a report[2] shortly after this with similar findings that recognised that Consultant Scientists are well-placed to fill the gaps that have arisen due to staffing issues within the medically qualified haematology workforce, making recommendations to Trusts to appoint Consultant Scientists to support haematology services and patient care.

Findings based on existing consultant/trainee consultant roles and expert opinion

Consultant Scientists form a small number of the haematology workforce. They provide expert consultant-level practice and are of high-value to haematology service-delivery across general haematology, haemostasis and thrombosis, haemoglobinopathy, haemato-oncology, molecular diagnostics, morphology, and hospital and Blood Service transfusion. Many have service leadership roles and work at all parts of the diagnostic pathway, whether this is in the laboratory or delivering direct patient care (or a mixture of the two). Given the high-level of expertise and utility of this role, the low number of posts suggest this is a highly under-recognised and under-utilised workforce resource ideally placed to address gaps in the medical haematology workforce. However, steps must be rapidly implemented to increase the number of Higher Specialist Trainees and opportunities for Higher Specialist Equivalence for both Biomedical and Clinical Scientists to expedite and maximise this workforce resource. A blended medical and scientific consultant workforce provides a flexible solution to staffing and recruitment issues in Haematology and Blood Transfusion, and progressive strategy for the future development of the profession.

Summary of recommendations

- Training and education for consultant Healthcare Scientist roles must be standardised across all pathology disciplines including Haematology and Transfusion to ensure confidence and assurance for employers.
- Training and education equity for Clinical Scientists and Biomedical Scientists to ensure all Healthcare Scientists have a career pathway to a Consultant grade in all pathology disciplines including Haematology and Transfusion.
- Suitably experienced and qualified Biomedical Scientists should be eligible to apply for an HSST post.
- Four proposed qualification routes that confer eligibility for biomedical scientists to apply for an HSST position are:
    - HCPC Registration as a Biomedical Scientist, plus IBMS Specialist Diploma and relevant MSc (the list of acceptable MSc programs for Haematology and Transfusion are available in the appendix).
    - HCPC Registration as a Biomedical Scientist, plus IBMS Specialist Diploma and IBMS Higher Specialist Diploma or IBMS 2-part Fellowship Special Exam.
    - HCPC Registration as a Biomedical Scientist, plus IBMS Specialist Diploma and IBMS Diploma of Expert Practice.
    - For Transfusion applicants, the British Blood Transfusion Society (BBTS) Specialist diploma in Transfusion Science Practice can be used in place of the IBMS Specialist Diploma.

- FRCPath must remain the ‘gold standard’ exit qualification for a consultant post.
- The RCPath must ensure their exam structure is flexible and progressive to ensure consultant HCS’s can deliver the diverse range of expert roles and services within haematology and transfusion.
- Professional bodies must acknowledge and endorse the role of the Consultant Scientist in haematology/transfusion and recommend their inclusion in consultant teams, recognising the benefits to workforce planning and delivery, their contribution across the whole diagnostic pathway, and increasing awareness of this to NHS Trusts (examples in this report).
- Suitably qualified and trained Healthcare Scientists should be added to the range of practitioners able to perform non-medical prescribing. This would enhance the scope of their roles and provide more flexibility in service delivery.

Background

1. Haematology and Transfusion is a scientific and medical specialty.
2. The Haematology Workforce Working Group (HWWG) is convened by the National School of Healthcare Science in Health Education England under what was the 'Diagnostic Oversight Group' in Pathology to look at Haematology and Transfusion and how this workforce can be transformed to make it more flexible, adaptable, multi professional and fit for purpose in the future with the intention of implementing something similar to that that is being developed in the Histopathology workforce.
3. The HWWG is chaired by Professor Berne Ferry from the National School for Healthcare Science (NSHCS) in HEE and a report will be presented to the new joint NHSEI/HEE Diagnostic Workforce Board via the Pathology subgroup of the Diagnostic Workforce Board.
4. Two Task and Finish Groups were set up to deliver this report. a) 'Identifying the Service Gaps', chaired by Dr Sharran Grey, b) 'Identifying a unified Education and Training pathway to Consultant level' chaired by Dr Lisa Ayers.
5. A) The ‘Service Gap’ Task and Finish sub-group was convened to explore, identify and report on the areas of haematology clinical and laboratory practice traditionally performed by medically qualified consultant haematologists, that could be performed by consultant healthcare scientists (i.e. Consultant Clinical Scientists or Consultant Biomedical Scientists). This was to address current gaps in haematology service delivery that have arisen due to difficulties in recruiting medically qualified consultant haematologists, the evolving clinical impact of laboratory workflows and the effect of an increase in workload, especially in haemato-oncology
6. B) The 'Consultant Level Education and Training pathway Task and Finish sub-group' was convened to explore, identify and develop and report on current and potential new training routes to consultant level for biomedical and clinical scientists in Haematology and Transfusion.

Purpose and Governance of the Task and Finish ‘Service Gap’ Sub-Group

1. Convene an expert forum representing the diversity within laboratory haematology (general, malignant, thrombosis and haemostasis, haemoglobinopathies, blood transfusion and clinical practice/direct patient care (DPC)) with both scientific and medical representation.
2. Identify ‘service gaps’ where medically qualified consultant haematologists have been unable to fulfil because of recruitment issues, gaps in specialist expertise issues or workload pressures.
3. Identify areas of haematology practice traditionally performed by medically qualified

consultant haematologists that could be performed by consultant healthcare scientists. These may or may not represent 'service gaps' but would nevertheless alleviate staffing pressures by allowing service re-design. This may include (but not limited to) the development of new/expert roles and blended clinical and scientific teams.

4. The members of the group will provide expertise on identifying areas of consultant-level haematology practice that could be performed by a consultant healthcare scientist, and review existing data and publications to identify where 'service gaps' exist or where there is potential for them to emerge in the future.
5. When convened the group was responsible and accountable to the HEE Directors of Education and Quality, and HEE's Senior Leadership Team who will approve recommendations as appropriate and report those decisions to the Executive, via the HWWG. While this governance process remains, in addition, the HWWG will not also report to the joint NHSEI/HEE Diagnostic Workforce Board. Each represented organisation is accountable through their own hierarchies and should ensure that all decisions are appropriately reported. Adhering to the NHS Code of Accountability and the Nolan Principles of Public Life members will ensure that potential conflicts of interest are identified, declared and managed appropriately.

Service Gaps in Clinical and Laboratory Haematology/Transfusion: What is Known from Published Sources

The British Society for Haematology published a comprehensive analysis of the UK Clinical Haematology workforce in 2019 (1). The key findings highlighted vacant posts are a major issue and that staffing would be insufficient even if the workforce was stable. This is exacerbated by the need for service expansion to accommodate new therapies and increasing complexity of the clinical workload in an ageing population with longer survival. The imbalance is further compounded by retirements, difficulties in recruitment to both substantive and trainee posts, and absences due to sickness and stress, with the concern this will inevitably impact on patient access to diagnostics and treatment. The BSH underlines its commitment to forging a way forward to ensure steps are taken to ensure adequate staffing and resource for patient benefit, and will be included in the next phase of the Society's strategic planning.

The Royal College of Pathologists also performed a workforce survey (2) to evaluate whether existing staff and skill mix was adequate to support high quality haematology services, recognising that medical haematologists currently provide a dual role across clinical direct patient care and laboratory services. Respondents to this survey expressed concern about the reduced time they were able to devote to the laboratory, while balancing increasing clinical pressures, and this was compounded by recruitment difficulties across all grades, increased use of locums, and colleague retirements. Some posts had remained vacant for years in the face of increased service demand. Concerns were also expressed about medical and clinical scientist

trainee numbers not being adequate for even maintaining the workforce, let alone growing it. Given these critical issues, the report acknowledges that action is required to explore novel ways of working. One respondent to the survey said:

"*(One of the) main problem(s) in haematology is the exponential rise of the haematological cancer workload with an explosion of new drugs having a huge beneficial impact on patient survival – with this comes larger and larger clinics, ward rounds, calls for advice, etc., such that medically trained consultant haematologists are now increasingly absent from labs as they are dealing with cancer. Increasingly, I think consultant clinical scientists will be required to fill the gap this leaves behind at the interface between the lab and clinical services at the diagnostic end of haematology patient journeys in the future.*" (RCPath, 2020)

The college stated their commitment to recommending and encouraging trusts and employers to appoint consultant clinical scientists to support haematology services and patient care. This is an important endorsement for new ways of working.

The value of the Consultant Healthcare Scientist to the clinical and laboratory aspects of patient care has been recognised. Hallworth et al (3) described generic and specific competencies of the Consultant (Clinical) Scientist, demonstrating the positive impact at a patient-level on diagnostic investigation strategy and result interpretation in the context of the patient's condition; and the expert role in the design and delivery of diagnostics test/clinical pathways and diagnostic services.

NHS Wales published a report in 2018 (4) looking to create a more inclusive workforce model for healthcare scientists in terms of addressing service challenges, recognising the expertise and value of the healthcare scientist at every point across the patient pathway. The ambition of workforce transformation will include reviewing extended scope of practice and transferability of knowledge and skills allowing diversification within the scientific and clinical sector.

Each of these areas of work are fundamentally important in creating a foundation for transforming haematology service-delivery by creating the means to re-design and deliver services in a novel and flexible way. This will ensure the diverse range of clinical and laboratory haematology services are delivered in a way that makes the most effective use of the precious staff resource we have, and expertise is delivered at the point of greatest value to the patient, and resilience for the future.

Service Gaps in Clinical and Laboratory Haematology/Transfusion: Expert Opinion

Haemostasis and Thrombosis

An underused yet obvious example of an area for extended practice in haemostasis and thrombosis is anticoagulant management and dosing. There are some examples of Biomedical

Scientists in this role who have undertaken the IBMS Diploma in Expert Practice, but the role is often undertaken by medically qualified doctors, pharmacists or specialist nurses. There is a role for consultant scientists in community-based diagnostics and these roles would require the ability to 'supply and administer' medicines, necessitating the addition of healthcare scientists to the professional groups who can legally be non-medical prescribers.

An expert role in guiding choice and interpretation of diagnostic tests and taking investigative pathways to diagnostic conclusions, including interpretive clinical reporting, is much needed. This is an important aspect of consultant-level practice, and scientifically qualified consultants may be better placed than some medically qualified haematologists because they have an expert understanding of the tests themselves due to the depth of their training and knowledge. This could improve quality and safety of the service by minimising misinterpretation, by understanding the nuances of the tests. Experience has shown that the consultant scientist role can have a major value-adding benefit to testing strategy and diagnosis in this very complex area of practice. There is a clear need for expert support for clinical service-users who need testing and interpretation advice from a trusted and respected expert in their field. Unfortunately, examples of this role are rare but the fact they have evolved to produced highly effective consultant scientists demonstrates their value. Multi-disciplinary teams in this area of practice generally include medically qualified consultants, nurses and pharmacists: the consultant scientist in haemostasis and thrombosis is a clear gap.

The value of the consultant scientist in direct patient care is clear in this area of haematology, but this also extends to the development of clinical guidelines, translational research and teaching, to ensure a professionally balanced and best-practice approach. The clinical/scientific leadership of this specialist area is also under pressure. The majority of medically qualified haematology consultants have large clinical caseloads and are ward/outpatient-based and rarely in the laboratory. This is an important gap to address in terms of maintaining scientific direction and clinical relevance of the service.

Haematology Cancer Diagnostics/Molecular Pathology

The role of the consultant scientist within the haem-oncology and molecular diagnostics remit is wide-ranging even within this specific area of haematology. Consultant scientists are needed to report and validate results for both the flow cytometry and molecular haematology. Haematology is predominantly led by medically qualified consultants, whereas molecular haematology is more scientist-led and there is a definite identifiable role for the consultant scientist.

Haematological oncology, flow cytometry and molecular testing can be regarded as an integrated pathway with increasing importance of molecular testing. Consultant scientists with expertise in morphology, flow cytometry and appropriate reflex molecular testing are vital in the development of diagnostic algorithms and ensuring an appropriate and integrated testing strategy. Clinical scientists at FRCPath-level, have morphological skills akin to that of the medically qualified staff and are equally skilled and competent to report bone marrow and

peripheral blood films, as well as recommending the most appropriate flow cytometry and molecular panels. The interpretation of the immunophenotype along with the morphology and molecular results within an SIHMDS framework for integrated reporting is a position that lends itself to the clinical scientist rather than medically qualified staff due to the extensive scientific understanding and knowledge of assay nuances and limitations which are an integral component of clinical scientist training.

The consultant scientist may lead the overall service and therefore should also be involved in laboratory workforce planning and service development; activity related business cases linked to staff/ skill mix and scientific needs to support increasing and novel laboratory activities. There is also a teaching role for the consultant clinical scientist: so many diagnoses are based on complex scientific analysis and this should be taught to both medical and scientific staff by a very experienced scientist.

Haemoglobinopathy

Successfully embedding the haematology laboratory services fully into the patient care pathway for antenatal haemoglobinopathy screening is a key element of the national screening program. The laboratory should not be merely a provider of quality results but also provide a scientific advisory service across the entire pathway. Understanding the various technologies and their specific limitations, including the molecular elements, then advising on the interpretation of results combined from these technologies should be the role of an experienced scientist. The lead scientist should provide training to midwives, registrars and nurses, organising multidisciplinary team meetings and liaising regularly with the clinical leads, midwifery leads and counselling centres. Some medically qualified consultant haematologists in this area are purely clinical, with no laboratory role or understanding of the technical issues or possible developments. Beyond antenatal screening we are entering a new era of transplantation and novel treatments for patients with haemoglobinopathies so there is a growing need for expert scientists to be involved in the clinical pathways with interpretation to support patient care. This is a developing area where there is a clear role for the consultant-level scientist who has the experience, knowledge and skills to deliver an expertly led clinical and diagnostic service.

Morphology

Medically qualified haematologists may have limited laboratory time for practicing morphology and rely on scientific colleagues to pre-screen and sort referral films. Triaging of blood and bone marrow films has become necessary due to the increasing clinical pressures being placed on medically qualified consultant colleagues. Expert scientist roles are emerging in morphology to address this to ensure complex peripheral blood and bone marrow films are reported quickly and expertly. Expediting and maintaining high quality diagnostics in morphology is a critical aspect of the haematology diagnostic pathway. This is a highly-skilled area of haematology practice and well-suited to a consultant-level scientist who could also lead the teaching and training of morphology to scientific colleagues and medically qualified trainees.

Hospital Transfusion

Hospital transfusion has been traditionally led by medically-qualified haematologists with a responsibility for transfusion as part of their job plan. Increasingly the delivery of this responsibility has been put under pressure from competing priorities arising from workload pressures in other areas of the medical consultant's responsibilities, often to the detriment of supporting and developing hospital transfusion services. This area of haematology clinical practice is an ideal fit for the consultant scientist who will have highly specialist knowledge of both laboratory practice and transfusion medicine. Future investment in this approach will require support from both NSHCS and RCPath. For consultant scientists who work in hospitals, it is possible that transfusion may not be their only responsibility in haematology, and therefore it will be important that their training and education also be flexible enough to cover other areas of haematology so they can deliver a full service to their department. Discussions with the RCPAth around examination options will be important in this respect.

Blood Service Transfusion

Consultant haematologists within NHSBT support the functions within the blood service to provide a clinical link between NHSBT and the hospitals. Over the years there has been a reduction in the number of haematologists being recruited into these roles with the expertise required resulting in a service gap. It was identified as part of workforce planning that consultant clinical scientists would be able provide some of the services supported by the current team of consultant haematologists. Gaps identified are included below:

- Management of transfusion for patients with complex patients with unresolved serology
- Management of blood provision and testing of patients with auto immune haemolytic anaemia
- Management of blood provision and testing of patients being treated with therapeutic monoclonal antibodies which can affect blood group serology
- Management of obstetric cases with high titres/quantification of antibodies or multiple antibodies
- Management of blood provision for patients with antibodies to high frequency antigens
- Clinical advice for the laboratory
- Clinical liaison between colleagues in the hospitals
- Engaging in MDTs to ensure proactive management of blood provision or testing for challenging cases
- Participation in clinical audit programme
- Medical review of files for areas such as Cord Blood bank
- Participation on the on-call rota for clinical advice both for the RCI national rota as well as regional patient facing rotas dealing with general transfusion enquiries
- Staff development - training such as clinical case sessions shared learning
- Leadership on expert working groups

- Participation in service development
- QMS participation with an active role
- Jointly leading with a consultant haematologist on the haemoglobinopathy centres advising on complex blood requirements
- Supporting bodies such as BBTS, NEQAS and BSH guideline writing committees
- Education of external staff including all grade on external courses and through higher education institutes

This list is not exhaustive and there is room to expand the role to other areas of NHSBT including blood donor management. The use of a consultant clinical scientist to lead a service function is a well-established model within NHSBT's Histocompatibility and Immunogenetics and this could be replicated within other areas of the service.

Direct Patient Care

The consultant scientist has highly useful and under-utilised skills in direct patient care and an understanding of this has been constrained by the notion that scientists only work in laboratories in non-patient-facing roles. The consultant scientist is highly skilled in planning and performing diagnostic investigations and interpreting results to conclude a diagnosis and this may be enhanced by the opportunity to review the patient and their history in person. Clearly this requires the correct skills which can be included as part of their pre-consultant training and development by an appropriate supervisor. The FRCPath examination is a key qualification essential in demonstrating knowledge of assimilation of diagnostics and clinical context. Contribution to direct patient care can improve patient waiting times for diagnostics and streamline patient flow through the clinical haematology service. The consultant scientist could also potentially contribute at the therapeutic-end of the service which may include anaemia clinics and follow-up clinics where patients require dose adjustments of drugs such as steroids (e.g. immune thrombocytopenia), or hydroxycarbamide (e.g. myeloproliferative disorders). This is already recognised by medically qualified consultant colleagues as well as the pressure it would alleviate on other medical and non-medical prescribers. However, this is constrained as the current legal framework for non-medical prescribing which does not extend to Biomedical or Clinical Scientists. In contrast, blood components are not classified as drugs and therefore scientists could authorise blood transfusion, monitoring and managing transfusion-dependent patients. The consultant scientist can also provide support to other specialties requiring structured clinical haematology input. These may be joint specialty clinics where the scientist can provide expert diagnostic advice to consultant colleagues during the patient consultation.

Laboratory Service Leadership

Haematology and transfusion laboratories have traditionally required a medically-qualified lead to not only provide consultative and clinical support, but also be responsible for accreditation, regulation, EQA etc. This responsibility is often part of their job plan which can be put under

pressure due to competing priorities resulting in unintentional but nevertheless poor support to the laboratory. The consultant scientist is ideally placed for this role as they have expert knowledge of laboratory scientific and technical practice, and also consultant-level seniority, clinical knowledge and leadership skills.

Clinical Service Leadership and Service Re-Design

The growing impact of increased cancer-related clinical workload and recruitment issues on service delivery is clear and a radically different approach is needed to ensure a safe and quality service now, and for the future. This involves challenging the paradigm and traditional demarcation between laboratory and clinical services, and the dogma of medically-led laboratory services. Consultant scientists are just one, albeit important group of professionals required to optimise staffing across the whole service and patient pathway. The consultant scientist is a natural fit for the diagnostic-end of the service and this includes direct patient care as well as laboratory leadership and direction. The addition of a consultant clinical scientist to the consultant team can ease staffing issues, improve the management of new patients requiring investigation and diagnosis, and provide greater flexibility to re-organise over-burdened job plans with respect to laboratory and clinical transfusion 'Programmed Activities' previously allocated to medical consultants. There is an additional benefit to trainee medical staff in improved scientific and morphology training which can have a positive influence on departmental training status and reputation. The appointment of Advanced Nurse Practitioners working at the follow-up and therapeutic-end of the service can also alleviate the burden on medical staff

Purpose and Governance of the Task and Finish ‘Education and Training to Consultant Scientist’ Sub-Group

1. Convene an expert forum with experts in the education and Training of Scientists in Haematology and Transfusion to consultant level.
2. Identify new education and training routes for biomedical scientists to be given the opportunity to train alongside clinical scientists to Consultant Level using the FRCPath as the gold standard academic qualification in this training.
3. Identify eligibility routes for biomedical scientists to enter the existing funded HSST pathway to consultant level scientists.
4. Identify all processes by which biomedical and clinical scientists may progress onto the HSST programme.
5. When convened the group was responsible and accountable to the HEE Directors of Education and Quality, and HEE’s Senior Leadership Team who will approve recommendations as appropriate and report those decisions to the Executive, via the HWWG. While this governance process remains, in addition, the HWWG will not also report to the joint NHSEI/HEE Diagnostic Workforce Board. Each represented organisation is accountable through their own hierarchies and should ensure that all

decisions are appropriately reported. Adhering to the NHS Code of Accountability and the Nolan Principles of Public Life members will ensure that potential conflicts of interest are identified, declared and managed appropriately.

Consultant Level Training in Laboratory Haematology/Transfusion: Current Process

STP and HSST programmes

The Scientist Training Programme (STP) is a three-year programme of work-based learning, supported by a University accredited Masters degree. The aim of the programme is to deliver for the NHS haematology and transfusion post-graduates, who will possess the essential knowledge, skills, attributes and experience required of a newly qualified clinical scientist in the NHS. These scientists are competent to undertake complex scientific and clinical roles, defining and choosing investigative and clinical options, making key judgements about complex facts and clinical situations within a quality framework. The programme is competitive, aligns with workforce needs and is commissioned and funded via HEE. Graduates from the STP programme are currently eligible to apply for the HSST programme (see below).

The Higher Specialist Scientist Training (HSST) programme is funded by HEE. This programme provides an annual training grant over 5 years for clinical scientists. This HSST programme includes funding for a PgDip qualification in Leadership, a full DClinSci qualification for those without a previous doctorate, Fellowship of Royal College of Pathologists (RCPath), workplace place training mapped to the HSSR Standards of Proficiency, an Annual Review of Progression (ARP) and follow up support. At present however that the HSST programme is currently not open to all individual scientists with potential to develop.

There are two statutory registered workforce groups in for Life Sciences Healthcare Scientists: Clinical Scientists and Biomedical Scientists. Currently only registered Clinical Scientists have been eligible to access the HSST programme. Senior Biomedical Scientists could use one of three equivalence routes (Academy for Healthcare Science (AHCS), Institute of Biomedical Science (IBMS) or Association of Clinical Scientists (ACS)) to gain Clinical Scientist registration with the HCPC, however many do not want to change their professional registration or hold two registrations with its associated costs. This has limited the number of Haematology and Transfusion Healthcare Scientists joining the initial cohorts of HSST and accessing the benefits of this senior level training programme.

Consultant Level Training in Laboratory Haematology/Transfusion: Future Process

On Friday 11th September 2020, the National School of Healthcare Science in Health Education England, Academy for Healthcare Science, Institute of Biomedical Science (IBMS), Royal College of Pathologists (RCPath) and Manchester Academy of Healthcare Science Education (MAHSE) issued a joint statement announcing a widening of the of the eligibility criteria for HSST. The new criteria will allow appropriately qualified senior Biomedical Scientists, who can demonstrate ability to work at Level 7 via academic and professional qualifications, to apply to join the programme. Both Biomedical Scientists and Clinical Scientists will be subject to the same HSST application and interview process to determine suitability and readiness.

Eligible individuals will also need to meet the requirements of the Universities to commence a doctoral level programme, which includes a First or 2:1 Bachelors degree and a Masters degree in a relevant subject area or evidence of having written at that standard, and a minimum of four years working in a professional role. Individuals who do not meet these requirements through traditional qualifications may be required present a case to a University admissions tutor to demonstrate evidence of having written at Masters degree standard.

Training departments will need to achieve HSST training accreditation through the NSHCS to be successful in the commissioning rounds for HSST places. This includes demonstration of suitable workplace and research supervision at doctoral level, access to training to meet the specialism curriculum and HSST Standards of Proficiency and senior level trust support. The NSHCS offers support to new departments during the accreditation process.

All Life Science HSSTs must obtain Fellowship of the Royal College of Pathologists during the programme in order to complete HSST, in addition to the academic qualifications and sign off of their workplace training. These requirements of the programme will be identical for Clinical Scientists and Biomedical Scientists on HSST.

All scientists who successfully complete the HSST programme or equivalence are then eligible to join the Academy for Healthcare Science HSS Register and become a Fellow of the Academy.

This change to the HSST eligibility criteria will apply from 2021 entry to the HSST programme.

Examples of Past and Present Consultant, and Trainee Consultant Scientist Roles

Haemostasis and Thrombosis

Dr Gary Moore was formerly a Consultant Biomedical Scientist at St. Thomas' Hospital, London:

- Consultant Scientist for the largest diagnostic reference facility of its kind in the UK, operating as the lead specialist and primary source of advice in this area for Viapath Analytics.
- Responsible for maintaining and developing up-to-date diagnostic practices to international reference centre standards. Clinical interpretive role and consultative role providing highly specialist knowledge and advice to medical staff, up to and including consultant level, all grades of scientists, laboratory support staff, university based academic staff, nursing staff, clinical trial co-ordinators and other professional groups. Consultant level advice on assay choice and clinical interpretation available to internal and external enquirers within UK and beyond.
- Sole reporter of clinical interpretive reports for thrombophilia profiles.
- Expert practice in lupus anticoagulant assay interpretation and reporting.
- Devise and direct diagnostic pathways for patients requiring complex specialist investigations to achieve diagnostic resolution. Compose clinical interpretive reports.
- Conception, initiation and direction of R+D projects, including assay evaluation and validation.
- Maintain peer-reviewed publication record and contribute to peer review. Co-author of national and international guidelines.
- Lead educator in the science of diagnostic haemostasis and thrombosis for internal and external scientists, and rotational Specialist Registrars studying for FRCPath examinations.
- Present at local, national and international meetings.
- Outside the role, visiting specialist lecturer on post-graduate courses at three UK universities, Chief Examiner in Haematology for IBMS (15 years) and ex-officio member of IBMS member of IBMS Haematology Advisory panel, advisory board member of various diagnostic and pharmaceutical companies and consultancy appointments.

Dr Jane Needham is a Consultant Biomedical Scientist at the Haemophilia Haemostasis and Thrombosis Diagnostic Service, Hampshire Hospitals NHS FT:

- Significant experience of anticoagulant management and dosing in face-to face clinics along-side medical colleagues.
- Established a community-based 'postal' anticoagulant service using a dosing management system run by scientific staff.
- The anticoagulant service is changing quite radically again with most new patients prescribed direct oral anti-coagulant drugs which do not require monitoring. However, scientists are well placed to advise clinicians on appropriate treatment for individual patients and/or counsel patients to explain how their treatment works/risks.
- 15 years' experience of managing own clinical case load with patients referred to the New Bleeding Disorder Clinic. The main trigger for taking on this role was shortage of medical staff at the time. This has now expanded to seeing own patients requiring platelet studies and external referrals to the Platelet Function Clinic.
- The aim of the diagnostic service is to provide the referring clinician a diagnostic report with additional assays performed as required to provide a diagnosis without the need for numerous repeat blood tests and GP/OPD appointments to achieve a diagnosis.
- Direct patient care has brought significant benefits to patients and their diagnosis. Seeing the patient in the clinic and taking their history followed by requesting and then directing any additional investigations has streamlined investigations and improved service.
- Undertook and history-taking and physical examination course at the university and subsequently FRCPath to support the clinical aspects of this role.
- I interpret all patient results and write my own diagnostic/summary letters to referring clinicians/GP's and discuss where appropriate at our local MDT meetings. I also refer my own patients to other specialist services, e.g. rheumatology, and regional EDS/vascular services.
- Clinical lead for the Haemostasis and Diagnostics service for over 3 years and handed over in the last 6 months as this is a rotational post.
- Actively involved in translational research and clinical trials particularly with new treatments for haemophilia.

Haematology Diagnostic Clinics and Consultant Lead for the Laboratory and Clinical Transfusion

Dr Sharran Grey is a Haematology Consultant Clinical Scientist at Lancashire Haematology Centre:

- Started her scientific career as a Biomedical Scientist and after registering as Clinical Scientist via AHCS equivalence, was successfully appointed to a HSST post and completed my DClinSci and FRCPath.
- Now part of a consultant team with sub-specialised responsibilities as consultant lead for the Haematology and Blood Transfusion laboratories, and consultant lead for Clinical Transfusion. This was previously undertaken by a medically qualified colleague who experienced increasing difficulties in fulfilling the role due to cancer-related workload pressure.
- Employed by the Clinical Haematology Department (not the Pathology Laboratory) and has laboratory and clinical transfusion leadership responsibilities as part of job plan.
- Provide a consultative and interpretive role, giving expert opinion on test selection and interpretation, and also advise on laboratory procedures, clinical guidelines and policies.
- Responsible for the scientific direction of laboratory activities including EQA, accreditation and regulation, research and provide clinical support and direction to the laboratory.
- Oversee the validation and implementation of new technologies and methods.
- Teaching and training of multi-professional staff groups.
- Morphology on own caseload and provide opinion and support for registrar and laboratory scientific colleagues.
- Perform a haematology diagnostics clinic (autonomous practise), seeing patients referred from their GP's with numerical abnormalities of their blood counts, paraproteins or possible bleeding disorders. This includes taking a history from the patient, planning and arranging the diagnostic investigations and provide a diagnosis and plan. This has reduced the new patient workload for medically qualified colleagues, with the majority of patients being discharged back to their GP following investigation and only those with haematological disorders needing to be followed up in haematology.
- Provide clinical and diagnostic support to an obstetric haematology clinic.
- Outside this role is a regularly contributor at a national-level for the progression of the profession.
- An Honorary Associate Lecturer supporting MSc Biomedical and Clinical Science programmes.
- Has an interest in pulmonary complications of transfusion and is the Transfusion-Associated Circulatory Overload Working Expert for Serious Hazards of Transfusion (UK Haemovigilance Scheme), and regular contributor to regional, national and international meetings.

Molecular Pathology

Nicola Meakin is a Consultant Clinical Scientist and Head of Department for Molecular Pathology at University Hospital Southampton NHS Foundation Trust:

- I trained as a Grade A Clinical Scientist in Haematology, and obtaining FRCPath in Haemato-Oncology and General Haematology. I have specialised over the years into molecular Haem-Oncology and solid organ tumour testing.
- I am responsible for the following staff: Principal Clinical Scientists, Senior Clinical Scientists, Trainee Clinical Scientists, Biomedical Scientists, Medical Technical Officers, Medical Laboratory Assistants, Research staff and students (scientific and medical).
- I provide a high quality clinical advisory service on diagnoses and treatment of patients to medical and nursing staff within the Trust/Primary Care and external referrals from other Trusts and institutions by analysis, interpretation and reporting of results. I provide expert analytical and advisory service nationally, upon request.
- To independently discuss, advise and challenge clinicians including senior medical staff on the complex interpretation of results e.g. advise on differential diagnoses, monitoring, test requesting and referral options.
- I direct and manage the scientific service, set priorities and initiate / adjust ongoing plans for the service. This includes implementing developments within the department across both Trust and other organisational boundaries.
- I train staff to ensure compliance with professional standards and supervise Scientist Training Programme staff on appropriate training programmes, Specialist Registrars in training for the FRCPath and Biomedical Scientists.
- I liaise regularly with clinical users to ensure provision of a high-quality diagnostic service to achieve improved clinical governance.
- I write clinical guidelines and policies for the Department and for GPs and other Clinicians.
- I am responsible for the interpretation of broad professional policies and NHS guidelines and how these are then produced and implemented as local policies, which will lead to changes in working practice for the Trust / Department and result in improved performance of the department.
- I am responsible for quality assurance of the routine and specialised tests, including external assessment and internal monitoring and taking corrective action where the need is identified.
- I supervise the post graduate projects of Clinical Scientist trainees, Biomedical Scientists and medical staff.
- I train members of staff including Specialist Registrars, Clinical scientists, Biomedical scientists, Medical laboratory Assistants, Research Staff and medical and science students in the clinical relevance of tests, specimen requirements and clinical authorisation of reports.

Morphology and Haemoglobinopathy Lead Scientist

Dr Michelle Brereton is Chief Biomedical Scientist at Manchester NHS Foundation Trust, and lead scientist for morphology and haemoglobinopathy. She is an excellent example of a senior and expert scientist who clearly contributes at a consultant-level but historic education and career pathways have prevented her formally assuming this role.

- My role as the morphology lead scientist includes training clinical colleagues preparing for FRCPath (an exam my career pathway did not allow me the opportunity to take), organising and participating at the regular Haematological Malignancy MDTs where I may present on morphology and flowcytometry. I provide a triage service for bone marrows and am in training with the Consultant HCDP lead for full reporting of bone marrow morphology.
- Prior to my current role I completed MSc thesis in the cell culture of progenitor cells from patients with chronic myeloid leukaemia for transplantation; whilst working in the stem cell laboratory at Manchester. This 12-year post combined development of stem cell services with a research element at the Patterson Institute.
- As Biomedical Scientist Morphology lead my investigation of the quality in morphology reporting enabled me to collaborate with UK NEQAS(H) in the development and running of the national CPD scheme for digital morphology. This scheme we launched in 2008 now has more than 3000 registered participants, mostly UK based Biomedical Scientists but with medical and clinical scientist participants from UK and abroad.
- My examination of the sources of errors in morphology reporting derived from the UK NEQAS(H) scheme formed the basis for my Doctorate thesis and subsequent publications. I continue to work with UK NEQAS(H) and Consultant lead on new on-line teaching and support mechanisms for all professionals reporting on morphology.
- I work closely with the Consultant lead for the Haematological Cancer Diagnostic Service, participating and presenting at MDTs for peripheral blood, bone marrow, CSF and flowcytometry.
- Provide expert advice on laboratory procedures, responsible for interpreting and implementing guidelines and policies. Ensuring compliance with UKAS.
- Member of the Trust Board for screening services representing the laboratory haemoglobinopathy service. Facilitate MDTs with clinical colleagues and counsellors as laboratory lead for haemoglobinopathy screening.

NHSBT Trainee Consultant Clinical Scientist

Sara Wright is a trainee Consultant Clinical Scientist at NHSBT and came into the profession after completing her initial training as a Biomedical Scientist. She joined the Scientist Training Programme after finishing her undergraduate degree and registered as a Clinical Scientist. She

was put forward and was successful in being appointed to a HSST post in NHSBT. She is currently in year 5 and scheduled to complete her training 6 months with a view to appointment to a Consultant Clinical Scientist post.

Her roles within NHSBT include:

- Participation in the education of scientists and medics both within NHSBT and external students through the courses which are offered by the organisation.
- Contribute to research and development work.
- Clinical interpretation and authorisation of results, liaising with clinical teams as necessary to advise on patient care pathways, result interpretation, repeat testing and additional investigations that may be required.
- Supervising post graduate projects of MSc Students.
- Providing a clinical advisory service on complex transfusion problems to include transfusion reactions, transfusion advice and management of patients.
- Presenting at local and national meetings.
- Engagement with the quality management system within NHSBT.
- Author and Co-author internal documents defining procedures and policies.
- Undertaken roles within the National School of Healthcare Science for example becoming the lead station writer for Transfusion for the STP OSFA exam.
- An active member of NHSBT specialist working groups for multiple areas of RCI work.
- Participating in the clinical audit within NHSBT to ensure compliance with regulations as well as assuring patient safety.

Haematology Trainee Consultant Clinical Scientist

Nicola Svenson is a trainee Consultant Clinical Scientist at Hull University Teaching Hospitals NHS Trust and came into the profession late completing her initial training as a Biomedical Scientist. She joined the Scientist Training Programme after finishing her undergraduate degree and registered as a Clinical Scientist and therefore has dual registration. She was put forward and was successful in being appointed to a HSST post in her hospital Trust. This is jointly funded by the Blood Sciences and Clinical Haematology Departments. She is currently in year 4 and scheduled to complete her training next year and hopefully be successful in being appointed to a Consultant post.

- Contribute to the training and education of all scientists, medical registrars, and education of GP’s and GP registrars via the local medical school.
- Member of a Primary Care Working Group to highlight and improve service delivery and improvements.
- Member of the BSH General Haematology Taskforce contributing to guideline writing of national guidelines with focus on laboratory practices.
- Review of blood film morphology for cases which would normally be sent to

consultants/registrars for review. Provide interpretive comments; suggest additional testing, clinical examination (i.e. lymphadenopathy, B symptoms etc) or referral to haematology clinics.

- Undertake a clinical haematology clinic for myeloproliferative neoplasms where patients are monitored remotely or by telephone. Monitor hydroxycarbamide dosing and suggest adjustment based on blood results and/or patient symptoms. Where appropriate organise venesection. This is part of multidisciplinary team which includes a specialist nurse and a Clinical Pharmacist who does the prescribing. This may be extended to further clinics in the future for other chronic haematological conditions such as MGUS, Myeloma, CLL, CML etc.
- Review of EQA schemes including haematinics where testing is currently performed by our Biochemistry department.
- Clinical interpretation and authorisation of clinical haematology diagnostic and monitoring results, liaising with clinical teams as necessary to advise on patient care pathways, result interpretation, repeat testing and additional investigations that may be required.
- Support the department to maintain good performance in external quality assessment, compliance with laboratory accreditation, Trust clinical governance and service development.
- Contribute to regular research and development work.
- Initiate and direct the introduction of new methodologies within the department, ensuring that the methods are appropriate to the proposed clinical use and that their introduction is supported by Senior Staff.
- Introduction of new testing protocols and pathways for service re-design.

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- Royal College of Pathologists (2020) The haematology laboratory workforce: challenges and solutions. A Meeting Pathology Demand briefing. https://www.rcpath.org/uploads/assets/4632d8bc-0451-4983-9639768129f758ec/e369e06a-3088-4edd-95b21e1e15a9feba/haematology-laboratory-workforce-challenges-solutions.pdf (accessed 10.07.20)
- Hallworth, M., Hyde, K., Cumming, A., and Peake, I. (2002). The future of clinical scientists in laboratory medicine. Clin lab Haem. 24; 197-204
- NHS Wales (2018). The science behind prudent healthcare. Healthcare Science in NHS Wales
- Looking Forward. https://gov.wales/sites/default/files/publications/2019-03/healthcare-science-in-nhs-wales.pdf (accessed 10.07.20)
- Statement from RCPath, NSHCS, IBMS, MAHSE and AHCS re HSST

Appendix 1 – Acceptable MSc courses for Haematology and Transfusion HSST Eligibility

City/Town/Region	University and Address	Liaison Officers	Title of Award
BRISTOL	University of the West of England Faculty of Applied Sciences Frenchay Campus Coldharbour Lane Bristol BS16 1QY www.uwe.ac.uk	Dr Lynne Lawrance Tel: 0117 328 4261 Fax: 0117 328 2904 Email: lynne.lawrance@uwe.ac.uk	MSc Biomedical Science (Haematology) Ft and Pt by credit accumulation (2020) MSc Biomedical Science Ft and Pt by credit accumulation (2020)
BRISTOL	University of Bristol Department of Cellular and Molecular Medicine NHSBT 500 North Bristol Park Northway Filton Bristol BS34 7QH www.bristol.ac.uk	Dr Ann Pullen Email: A.M.Pullen@bristol.ac.uk	MSc Transfusion and Transplantation Sciences Ft and Pt (2019)
CAMBRIDGE	Anglia Ruskin University Faculty of Science and Technology East Road Cambridge CB1 1PT www.anglia.ac.uk	Dr Claire Pike Tel: 0845 271 3333 ext 2758 Fax: 0845 196 2811 E-Mail: claire.pike@anglia.ac.uk	MSc Biomedical Science PT Distance Learning (2022)

City/Town/Region	University and Address	Liaison Officers	Title of Award
CARDIFF	Cardiff Metropolitan University Cardiff School of Health Sciences Llandaff Campus Western Avenue Cardiff CF5 2YB www.cardiffmet.ac.uk	Dr Victoria Bradley Tel: 0292 020 5616 Fax: 0292 041 6982 E-Mail: vbradley@cardiffmet.ac.uk	MSc Biomedical Science (Immuno-haematology) Ft and Pt (2024)
CHESTER	Chester Medical School University of Chester Bache Hall Chester CH2 1BR www.chester.ac.uk	Dr Michelle Cordingley Tel: 01244 515 605 Fax: 01244 511346 Email: m.cordingley@chester.ac.uk	MSc Biomedical Science Ft and Pt by distance learning (2021)
COVENTRY	Coventry University School of Life Sciences Faculty of Health and Life Sciences Coventry University, Priory Street Coventry CV1 5FB www.coventry.ac.uk	Yvonne Elliott Tel: 024 7765 8632 Email: Yvonne.Elliott@coventry.ac.uk	MSc Biomedical Science Ft and Pt MSc Biomedical Science with Professional Experience Ft and Pt (2020)
EDINBURGH	Edinburgh University Postgraduate Office The Chancellor's Building 49 Little France Crescent Edinburgh EH16 4SB www.ed.ac.uk	Diane Anderson Tel: 0131 314 55002 Email: Diane.Anderson3@nhs.net	MSc Transfusion, Transplantation and Tissue Banking Pt (2021)

City/Town/Region	University and Address	Liaison Officers	Title of Award
GLASGOW	Glasgow Caledonian University School of Life Sciences Department of Biological and Biomedical Sciences Cowcaddens Road Glasgow G4 0BA www.caledonian.ac.uk	Dr Linda P Walsh Tel: 0141 331 3632 Fax: 0141 331 3208 Email: l.p.walsh@gcal.ac.uk	MSc Biomedical Science Ft and Pt (2024)
GREENWICH	The University of Greenwich Medway School of Science Central Avenue Chatham Maritime Kent ME4 4TB www.gre.ac.uk	Cathy Ronan Administrative Manager Tel: 020 8331 9978 Email: C.E.Ronan@gre.ac.uk	MSc in Biomedical Science Online by distance learning (2022)
KEELE	Keele University School of Life Sciences Huxley Building Keele Staffordshire ST5 5BG www.keele.ac.uk	Mr. Glenn Hussey Email: g.d.hussey@biol.keele.ac.uk	MSc Biomedical Science (Blood Science) Ft and Pt (2023)
KINGSTON	Kingston University Life Science Penhryn Road Kingston upon Thames KT1 2EE www.kingston.ac.uk	Dr Karen Whiting Fax: 0208 547 7562 Email: k.whiting@kingston.ac.uk	MSc Biomedical Science (Haematology) Ft and Pt (2022)

City/Town/Region	University and Address	Liaison Officers	Title of Award
LEEDS	Leeds Beckett University School of Clinical and Applied Sciences City Campus Leeds LS1 3HE www.leedsbeckett.ac.uk	Dr Donna Johnson Tel: 0113 812 7765 Email: Donna.Johnson@leedsbeckett.ac.uk	MSc Biomedical Sciences Ft and Pt (2022)
LEICESTER	De Montfort University School of Allied Health Faculty of Health and Life Sciences Hawthorn Building The Gateway Leicester LE1 9BH www.dmu.ac.uk	Dr Umakhanth Venkatraman Girija Tel: 0116 2577717 Email: umakhanth.venkatramangirija@dmu.ac.uk	MSc Advanced Biomedical Science Ft and Pt (2021)
LONDON METROPOLITAN	London Metropolitan University Health and Human Sciences Department 166-220 Holloway Road London N7 8DB www.londonmet.ac.uk	Ms Sheelagh Heugh Tel: 0207 133 2153 Fax: 0207 753 5402 Email: s.heugh@londonmet.ac.uk	MSc Biomedical Science Ft and Pt (2023) MSc Blood Science Ft (2023) MSc Blood Science (Distance learning) Pt (2023) MSc Biomedical Studies (Distance learning) Pt (2023)

City/Town/Region	University and Address	Liaison Officers	Title of Award
LONDON MIDDLESEX	Middlesex University Department of Biomedical Science School of Health and Social Sciences The Burroughs London NW4 4BT www.mdx.ac.uk	Dr N Hall Tel: 0208 411 6066 Email: n.hall@mdx.ac.uk	MSc Biomedical Science (Haematology and Transfusion) Ft and Pt (2021)
LONDON WESTMINSTER	University of Westminster Department of Biomedical Sciences School of Biosciences 115 New Cavendish Street London W1W 6UW www.westminster.ac.uk	Dr Ian Locke Tel: 0207 911 5000 ext 64151 Fax: 0207 911 5087 Email: i.c.locke@westminster.ac.uk	MSc Biomedical Sciences Ft and Pt (2023) MSc Biomedical Sciences (Haematology) Ft and Pt (2023)
MANCHESTER	Manchester Metropolitan University School of Healthcare Science Faculty of Science and Engineering Chester Street Manchester M1 5GD www.mmu.ac.uk	Dr Lisa Coulthwaite Tel: 0161 247 6234 Fax: 0161 247 6357 Email: L.Coulthwaite@mmu.ac.uk	MSc Biomedical Science Ft and Pt (2019) MSc Haematology and Transfusion Science Ft and Pt (2019) MSc Biomedical Science (By Research) Ft and Pt (2019)

City/Town/Region	University and Address	Liaison Officers	Title of Award
NOTTINGHAM	Nottingham Trent University School of Science Clifton Lane Clifton Nottingham NG11 8NS www.ntu.ac.uk	Mr Mike Palmer Tel: 0115 848 3263 Fax: 0115 848 6680 Email: Mike.palmer@ntu.ac.uk	MSc Biomedical Science Ft, Pt and Sw (2022) MSc Biomedical Science by Flexible Learning (Haematology) (2022)
PAISLEY	University of the West of Scotland School of Engineering and Science Paisley Renfrewshire PA1 2BE www.uws.ac.uk	Dr John McLean Tel: 0141-848-3124 Fax: 0141-848-3663 Email: john.mclean@uws.ac.uk	MSc Advanced Biomedical Science Ft and Pt (2020)
SHEFFIELD	Sheffield Hallam University Division of Biomedical Science Howard Street Sheffield S1 1WB www.shu.ac.uk	Dr Rowena Bunning Tel: 0114 225 3012 Fax: 0114 225 3066 Email: R.A.Bunning@shu.ac.uk Dr Keith Miller Tel: 0114 114 225 5555 Email: k.miller@shu.ac.uk	MSc Biomedical Science Ft and Pt (January 2021)

City/Town/Region	University and Address	Liaison Officers	Title of Award
ULSTER	Ulster University Faculty of Life and Health Sciences Coleraine Campus Cromore Road Co. Londonderry BT52 1SA www.ulster.ac.uk	Dr Declan McKenna Tel: (0)28 7012 4356 Fax: 0287 032 4965 Email: dj.mckenna@ulster.ac.uk	MSc Biomedical Science (including PgCert Biomedical Science and PgDip Biomedical Science exit awards) Pt by distance learning (2022) MSc Biomedical Science (Haematology) Pt by distance learning (2022)
WOLVERHAMPTON	University of Wolverhampton Division of Biomedical Science Wulfruna Street Wolverhampton WV1 1BS www.wlv.ac.uk	Dr Kesley Attridge Tel: 01902 321 149 Fax: 01902 322 714 Email: k.attridge2@wlv.ac.uk	MSc Biomedical Science Ft and Pt (2019) MSc Biomedical Science (Haematology) Ft and Pt (2019)
WREXHAM	Wrexham Glyndŵr University Mold Road Wrexham LL11 2AW www.glyndwr.ac.uk	Dr Joanne Pike Tel: 01978 293596 Email: j.pike@glyndwr.ac.uk	MSc Biomedical Science Ft and Pt (2022) MRes Applied Biomedical Science Research Ft and Pt (2022) MRes Applied Clinical Research Ft and Pt (2022)