The Bulletin

of the Royal College of Pathologists

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The Royal College of Pathologists

Pathology: the science behind the cure

Pathology:
at the heart
of your health

Celebrating our Diamond Jubilee

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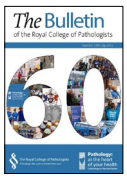
The Royal College of Pathologists
Pathology: the science behind the cure

CONTENTS

JULY 2022 NUMBER 199



On the cover: On 21 June, we celebrated our 60th Anniversary. The cover includes images from the last 60 years and our recent celebrations.

EDITORIALS

From the Editor

Dr Shubha Allard

Welcome to the July *Bulletin*. It is really good to see some sunshine. Hopefully, you will be able to have a well-earned break with friends and family without too much disruption over the summer. Many of you are also no doubt trying to re-adjust your work–life balance – getting to grips with greater work-related travel while accommodating already expanded virtual schedules.

We are mid-way through the College's Diamond Jubilee year and we have been delighted with the engagement from across the breadth of pathology with contributions to the *Bulletin* and other College activities. While the Open Day had to be deferred to 8 September following rail strikes, the virtually delivered Foundation lecture by Professor Sir Jonathan Van-Tam was a tour de force. National Pathology Week (NPW) 2022 was successfully moved from November to coincide with the week of our 60th anniversary in June.

In this issue we have specialty updates from cellular pathology (p 610), cytopathology (p 614) and histocompatibility and immunogenetics (p 619), as well as an update on organ transplantation and the many teams that support this essential patient need (p 622). We also have a timely reminder of the importance of investment into research and development across various strands of clinical and donor transfusion and transplantation research (p 626).

The whole of pathology is underpinned by its exceptional workforce and the College's Workforce team showcases its efforts in supporting members and influencing government policy (p 629). We have also profiled our Director of Professionalism (p 638) who oversees the important work of the Clinical Effectiveness, Professional Standards and Workforce teams and supports the College's Equality, Diversity and Inclusion Network.

The mythbusting article around SAS doctors is revealing and this group certainly needs support. Many of these professional journeys are interesting and sometimes tortuous and we are pleased to highlight successes and achievements (p 635).

We remain committed to supporting the training and career development of clinical scientists across many specialties. Berne Ferry and Lisa Ayers from the National School of Healthcare Science have built further on previous articles with a current update on the successes of the consultant clinical scientist training programme (p 654). The accompanying reflections from haematologists and microbiologists from a medical and a scientist background certainly make interesting reading.

The Biomedical Scientist Empowerment, Education and Discussion Group was set up during lockdown but continues to grow and provide much-needed virtual learning opportunities to laboratory staff and other healthcare professionals (p 640).

Collaboration between departments is often essential in driving improvements in patient care, as is showcased by the award-winning project from the interventional radiology and haematology departments at Manchester Royal Infirmary. They were the recipients of a Health Service Journal Patient Safety Award and they give an account of their project and recommendations for future studies in the field of peri-operative and surgical care (p 642).

We have a useful article about the rollout of the now statutory requirement for all deaths to be scrutinised by the Medical Examiners Service in England and Wales by using already established, cost-neutral NHS referral pathways (p 657). Further practical articles assess the effect of the pandemic on antifungal stewardship in a UK tertiary teaching hospital with a review of prescribing practices and therapeutic drug monitoring (p 660). An expert panel provides helpful insight into good design practice principles to deploying and sustaining digital pathology and the effective integration of artificial intelligence into diagnostic workflows (p 675).

The College's commitment to supporting international members and projects is clear with an updated account on the College's role in the African Research and Innovation Initiative for Sickle Cell Education (ARISE), which brings together researchers and clinicians (p 648). We have also profiled the many career highlights of Professor Mona El-Bahrawy, Consultant Histopathologist at Imperial College London and President of the Egyptian Committee for Pathology Training (p 646).

Now back to summer and trying to enjoy the outdoors. We have arranged tours of the Royal College of Physicians' Medicinal Garden for College members (also open to friends and family of members if spaces are available) with a great location opposite Regent's Park. I am delighted to be getting pathology colleagues working with the Royal Horticultural Society in widening the public reach to our specialties. Do contact me if you are interested in getting involved!

Dr Shubha Allard
Bulletin Editor

RETURN TO CONTENTS

From the President

Professor Mike Osborn

Hello and welcome to the July *Bulletin*. It's been a very busy period for the College since the last *Bulletin* but, before covering some of the great things the College has been involved in, I wanted to update you on the direction of travel for the College now we are hopefully out of the worst of the COVID pandemic.

'Your College, Your Profession'

When I became President, I highlighted the importance of returning the College to focus on its core functions. During the last 18 months, I have met many of you online and, more recently, in person as I have travelled around the four nations of the UK – you have told me there is much more we could do to represent and support you and deliver value for money. As we emerge from COVID and can now focus on activities beyond just coping during the pandemic, tackling these challenges is now a priority for me and the College.

This autumn I will be leading a member engagement tour around the UK entitled 'Your College, Your Profession'. The tour will give you the opportunity to tell us what you individually want and need from us, how we can further support the work of your service and what you think we need to do to further the development of the profession across all our specialties. We are committed to listening to you, our members.

The tour will be open to all members and is a starting point in what will be an ongoing process, aligned to our existing strategy, ensuring members are the central pillar for everything the College does. We want and will work hard to hear everyone's view and to listen to all opinions, positive and negative, so we can build on our work to support pathology and services to patients.

I encourage you all to engage with this process regardless of background or position as we aim to truly represent all aspects and members of the College. We will be holding nine tour events covering all four nations of the UK. Please look out for further details in the coming weeks. If you would like to register your interest in attending an event, please complete this form.

Highlighting pathology issues

Over the past few months, the College has been working very hard to represent members and to lobby government and policymakers in all our four nations on issues that continue to cause problems for members in all specialties, particularly those around workforce and resources. I have had numerous meetings with Westminster Labour politicians and their teams. These included Feryal Clark MP, Shadow Minister for Primary Care and Patient Safety, who has a very good understanding of pathology, genomics and the issues affecting us as pathologists, doubtless helped by her degree in Bioinformatics. Feryal was extremely helpful and supportive and has raised issues relating to pathology in parliamentary questions.

In early June, I met Wes Streeting's team with a view to arranging a meeting with Wes, Shadow Secretary of State for Health and Social Care. Dr Sarah Harrison, policy adviser to Wes, was very receptive to the issues I raised around workforce and support for all our specialties to help us deal with the increased demand for services relating to the backlog, cancer and genomics.

The 'Parliamentary Links Day' organised by the Royal Society of Biology in Parliament on 28 June gave me the opportunity to meet with MPs from all parties. I was pleased to meet up with my fantastic constituency MP, Ellie Reeves. Ellie has helped us highlight pathology and healthcare issues, especially around workforce and investment, and we are grateful for the support given by Ellie and her team who have also facilitated our meetings with members of the Shadow Health Team.

I was also able to meet Viscount Stansgate from the House of Lords. The Viscount is Vice President of the Parliamentary and Scientific Committee and is involved in running the Society of Biology. He has a huge interest in championing science and healthcare and is very supportive of pathology and pathologists. We are working together to find ways we can better champion the needs of pathology and pathologists.

The chairs of our regional councils have also been very active in meeting politicians and policymakers in their own countries. They are working to develop recovery plans and to highlight the role and importance of pathology and pathologists. In addition, our England regional representatives have been meeting local policy and decision-makers and working with the new Integrated Care Systems (ICSs) to ensure the voice of pathology is heard and the needs of our members recognised.

Regional update

As always, there has been a lot going on in the devolved nations. In May, I attended the Faculty of Public Health's 50th Anniversary Reception where all four Chief Medical Officers (CMO) from across the UK spoke, took questions and met attendees. It is very unusual to have all four CMOs together, and their insights on the pandemic and other major healthcare issues around the UK were informative, enlightening and interesting. They have informed our subsequent discussions with them and with others.

RETURN TO CONTENTS

A few weeks later, I attended various Northern Ireland events. These were held online owing to the COVID restrictions in place when the events where organised, but included a breakfast meeting with Professor Sir Michael McBride, Northern Ireland CMO, in which we discussed the particular issues facing pathology services and pathologists in Northern Ireland. It was a very useful meeting and Professor Michael was very helpful and supportive. We will certainly be working together more in the future.

I also attended the regional council meeting and annual symposium where I had the opportunity to meet trainees. All these events were very useful and have informed the way I and the College can promote and support pathology in Northern Ireland. Thanks to all those involved who made me so welcome, especially Dr Gareth McKeeman, Chair of the NI Regional Council.

At the beginning of July, I was able to attend, in person for the first time, a variety of events in Wales. The discussions at the regional council meeting around not only the specific support needed by pathologists in Wales, but also the general issues facing pathology, were extremely valuable in generating ideas that will develop the work and activities of the College. This meeting was followed by a discussion with Dr Helen Cordy, who is the College's trainee representative for Wales and provided helpful feedback that will develop our support for trainees and the way we deliver and run exams for everyone.

The final formal event was the annual symposium where a variety of excellent speakers discussed a range of issues mainly around or related to cancer and cancer services, genomics and associated topics. These highlighted some interesting and useful points to aid further discussion and College work not just in Wales, but in the UK and worldwide.

At the weekend after the main meetings, I was lucky enough to take part in a section of the Wales Coast Path, which pathologists and their friends and families undertook as part of our Diamond Jubilee celebrations. I was joined by colleagues and walked around Cardiff Bay and then on to Penarth Pier and back. It was a fantastic day finishing outside the Senedd. I was thrilled to be accompanied by the Mayor of Penarth, who was very supportive of pathology and the issues facing our members, which we discussed as we walked. My wife and even my dog, Scout, came along (he loved it).

Right: Professor Mike Osborn attending the Welsh Coastal Walk as part of the College's Diamond Jubilee celebrations.

Left: Professor Mike Osborn alongside Dr Jonathan Kell, Wales Regional Council Chair, and Dr Ian Frayling, President of The Association of Clinical Pathologists, at the Wales Regional Council meeting.

Others, including Dr Jonathan Kell, Wales Regional Council Chair, made the much more arduous walk from Barry Island to Cardiff, meeting up with us for the final leg from Penarth. Elsewhere in Wales, Dr James Davies MP took part in the walk from Prestatyn to Rhyl along with a group from the Betsi Cadwaladr University Health Board, organised by Dr Anu Gunavardhan, Wales Regional Council member.

The coastal walk was a brilliant, fun event and one I was delighted to be asked to take part in. Thank you to our members and their friends and families who joined us. I would also like to thank Jonathan and everyone in Wales for making me so welcome at the meetings and on the walk and for ensuring the whole trip was so enjoyable and productive.

There have been other events in Wales to celebrate our Diamond Jubilee. These included a lecture at the Senedd sponsored by Vaughan Gething MS, Minister for the Economy, and given by Professor Meena Upadhyaya OBE – a medical geneticist and honorary professor at Cardiff University. In her lecture, Meena discussed her life, work and the challenges she has faced. Meena is inspirational and dedicated to medicine, genetics and improving opportunities for everyone. I met Meena during my recent trip to Wales and her thoughts and comments will help us develop and progress the College's equality, diversity and inclusion agenda with which she is involved. Thank you Meena for all your help and support in this area.

These events in Northern Ireland and Wales have highlighted the importance and value of meeting members from all our four nations and all regions of the UK. The Scotland Regional Council will be holding their council meeting and

RETURN TO CONTENTS

symposium later this year and I am very much looking forward to attending those events hopefully in person but failing that online. Similarly, the 'Your College, Your Profession' engagement tour will give me the opportunity to meet and hear from our members from all over the UK.

National Pathology Week

This year we moved National Pathology Week (NPW) from November to 20–26 June to coincide with the College's 60th Anniversary. The theme for NPW was 'Pathology: past, present and future' and it was a fantastic week with both College-led and member-led events taking place all across the UK.

I was thrilled to kick-start the week of celebrations by introducing our virtual panel discussion exploring the history of the College, key milestones for pathology, current practices, hot topics, and future advancements. The panel was fantastically chaired by past-President Dr Suzy Lishman CBE and featured experts from different pathology specialties.

Another highlight of the week was the RCPath Book Club with Professor Heidi Larson and hosted by Vice President for Learning Professor Angharad Davies. During the event, the expert panel of contributors discussed key themes and ideas explored in Heidi's book, *Stuck: How Vaccine Rumours Start – and Why They Don't Go Away*.

As well as being able to showcase the vital contribution of pathologists to healthcare, NPW also provides an opportunity to improve awareness among students and undergraduates. In this vein, we hosted two virtual pub quizzes for undergraduates studying medicine or biomedical science, and those interested in or studying veterinary pathology. With a range of questions gathered from members who work in different specialty areas, the quizzes gave UK-based and international students the chance to test their knowledge of disease prevention, diagnosis and treatment.

As a result of the popularity of the quizzes among international students, we are running a special virtual quiz aimed at international students in November.

Celebrating our Diamond Jubilee

Tuesday 21 June 2022 was officially the day of the College's 60th Anniversary and, as you know, we had planned a fantastic selection of events for this day, including an Open Day with many members, friends and significant policy and decision-makers due to attend. Unfortunately, the Open Day had to be postponed owing to the national rail strikes and tube strikes. We were not the only ones affected by these strikes with the Faculty of Public Health postponing their 50th anniversary events the day after ours on 22 June and even the Royal Opera House cancelling its performances because staff, performers and the audience were unable to make it in. Our Open Day will now take place on Thursday 8 September and promises to be a fantastic event with many of those who planned to attend in June coming to meet pathologists and hear about pathology and pathology issues.

The highlight of the Open Day has to have been the College's Foundation Lecture given by College Fellow Professor Sir Jonathan Van-Tam – the well-known and highly respected Deputy CMO for England during the COVID-19 pandemic. Although the lecture could not go ahead in person as planned, fortunately Sir Jonathan very kindly agreed to move the lecture online and was still able to give the lecture 'live' on the actual day of our Diamond Jubilee.

The lecture was fantastic and a great way to celebrate our Diamond Jubilee. Sir Jonathan discussed his take on the pandemic and the lessons learned, together with his contribution to the UK Vaccines Taskforce and the Joint Committee on Vaccination and Immunisation. However, beyond that, he gave advice and insight on responding to and managing rapidly developing and changing events with sometimes only limited information available, as well as how to work with the media and politicians during such fast-moving situations.

The feedback from the lecture was excellent and we had more than 200 people watching online, including some extremely eminent policy and decision-makers. The lecture is available online and I would thoroughly recommend it. I would like to thank Aiforia, the sponsor of our Named College Lecture Series, which includes our Foundation Lecture.

So looking forward, I wish you all a lovely summer and look forward to meeting and hearing from as many of you as possible during our 'Your College, Your Profession' tour in the autumn.

Professor Mike Osborn
President

RETURN TO CONTENTS

CELEBRATING OUR SPECIALTIES

Dr Shubha Allard

This is the third of our four Diamond Jubilee *Bulletin* issues, and I am truly delighted with the participation from across the pathology community with colleagues again pulling together some excellent collaborative articles.

The review by Adrian Bateman and colleagues on behalf of College's Cellular Pathology Specialty Advisory Committee (SAC) provides a fascinating update on evolving roles and techniques used in patient care and to support public health. Traditional methods such as immunochemistry remain useful but updated technologies are being embraced, in particular the many applications of molecular pathology in diagnosis and determining prognosis in neoplastic disease (p 610).

There is well-deserved recognition of the College's role in developing and maintaining cancer datasets and tissue pathways, which promote a consistent high-quality approach to managing pathology specimens and reporting neoplastic diagnoses, with currently over 40 datasets covering all major cancers.

The increasing complexity and workload places significant demands on cellular pathology services that can be hard to manage but, equally, makes the specialty interesting, exciting and attractive to new recruits. Rising to various challenges will enable the specialty to be responsive to change, harnessing new ways of working and technologies towards a truly modernised service that fits with the needs of patients within the evolving NHS. These include managing subspecialisation, supporting multidisciplinary team working, effectively deploying digital pathology, together with recognising and embracing new talent and the potential of scientific roles in partnership with medically trained pathologists.

> The increasing complexity and workload places significant demands on cellular pathology services that can be hard to manage but, equally, makes the specialty interesting, exciting and attractive to new recruits.

The review concludes by noting and celebrating some key figures contributing to development of the specialty in the UK and the international arena. We aim to include these suggested giants from cellular pathology in our initiative at recognising '60 people at 60' as part of the College's Diamond Jubilee celebrations – further details to be released later this year.

The title for the article by Paul Cross and colleagues 'Cytopathology – the dark art that came into the light' itself speaks a thousand words (p 614). The highly informative and entertaining article describes the history, background and development of cytopathology as a specialty within a wider context. There is acknowledgement of traditional methods with the aptly described 'bed rock of cellular morphology' but with emphasis again on incorporation of the wider range of techniques for molecular and genetic testing.

> The cervical screening programme is now well known to have prevented thousands of cases of cervical cancers in the UK. The development of the Breast Screening Programme ... emphasises the use of cytology as a mainstream diagnostic tool.

Some of the key successes highlighted are in the field of cervical cytology, including setting up the National Coordinating Network for Cervical Screening in 1985 with stringent attention to quality control. The cervical screening programme is now well known to have prevented thousands of cases of cervical cancers in the UK. The development of the Breast Screening Programme in the late 1980s and onwards emphasises the use of cytology as a mainstream diagnostic tool. Advances in sampling techniques with fine needle aspiration cytology supported by radiology and clinical examination facilitate a patient-focused diagnostic and management approach.

Training and workforce challenges are emphasised with recognition of developments such as the establishment of the Conjoint Board between the College and the Institute of Biomedical Science (IBMS) in 2001 and development of an agreed pathway for biomedical scientists to obtain qualifications and recognition for the reporting of cervical cytology at consultant level. I particularly liked the vignettes from colleagues describing their experience around how cytology has moved on from 'the dark into the light' and now looking forward into the future.

David Turner, Chair of the Histocompatibility and Immunogenetics (H&I) SAC, starts his review by recognising the pioneering and now legendary names in transplant immunology segueing nicely into advances in the specialty

RETURN TO CONTENTS

(p 619). These include the elucidation of new HLA genes and alleles and the development of assays for HLA typing and HLA antibody definition ranging from lymphocytotoxicity, flow cytometry to the application of molecular techniques and polymorphisms.

> The pandemic brought unprecedented challenges to organ donation and transplantation, but also new ways of working, including collaboration on an international level and an even greater emphasis on multidisciplinary working.

He includes service developments with the 23 H&I labs around the UK supporting organ transplantation, transfusion medicine and diagnosis of autoimmune disease and drug hypersensitivity. These are staffed by biomedical scientists and clinical scientists and David outlines the training requirements and staffing challenges.

This article is followed nicely by a comprehensive review of organ donation in the UK with Maria Ibrahim, Claire Williment and John Forsythe from NHS Blood and Transplant (NHSBT) (p 622). Over the last decade, the number of UK donors has increased by 56%. Further improvement in the number of donors is expected with the introduction of opt-out legislation, which started in 2015 in Wales and then being adopted by England in 2020 and Scotland in 2021 with Northern Ireland soon to follow.

> The [Blood and Transplant Research Units] ... will focus on research that will benefit organ donation and transplantation. Much of the work in the [Blood and Transplant Research Units] will look to reduce health and improve access to new treatments.

The pandemic brought unprecedented challenges to organ donation and transplantation, but also new ways of working, including collaboration on an international level and an even greater emphasis on multidisciplinary working. There is helpful data and figures on trends in consent and transplantation rates.

The thoughtful article concludes with an overview of future improvements, including tackling barriers to organ and tissue donation sensitive to different faiths and beliefs, enhancing organ utilisation and supporting the workforce. The article also highlights the UK's position in driving innovation in transplantation as a world leader in many aspects of the field including novel research.

There is clear synergy with the final article within this theme with the launch in April 2022 of five collaborative Blood and Transplant Research Units (BTRUs) funded by the National Institute for Health and Care Research (NIHR) and NHSBT (p 626). The BTRUs, developed in partnership with leading universities, will focus on research that will benefit organ donation and transplantation, and blood transfusion. They will use data to improve clinical outcomes, donor behaviour and health, and precision cellular therapies while bridging the gap between R&D and translation to clinical practice. Much of the work in the BTRUs will look to reduce health disparities and improve access to new treatments.

The BTRU on organ and transplantation research will study the role of modern perfusion testing on the quality and viability of organs. Technology will be used to measure genes and proteins in donor organs to predict long-term individual outcomes. They seek to improve tissue matching to enable transplants in difficult-to-match patients, including those needing a re-transplant and ethnic minority groups. Tools will be assessed for patient-focused reporting of quality of life after transplantation.

I have greatly enjoyed reading these articles and look forward to seeing a further tranche celebrating pathology specialties in the next and final of our four linked Diamond Jubilee *Bulletin* issues.

Dr Shubha Allard
Bulletin Editor

RETURN TO CONTENTS

CELLULAR PATHOLOGY

Cellular pathology includes many subspecialties, including cytopathology and dermatopathology. Cellular pathologists are doctors and scientists who diagnose and study diseases including cancer and inflammatory diseases such as ulcerative colitis in tissues and organs. Examination by microscope of a small biopsy or tumour can provide the diagnosis but, increasingly, this is supplemented by DNA examination of cancers to tailor treatment.

Adrian Bateman

Newton Wong

Cellular pathologists play a vital role in developing a greater understanding of disease and abnormalities in organs, tissue and cells. As technology develops, cellular pathology is evolving to further support public health. Discover more about the key achievements of this specialty from the advent of immunohistochemistry and molecular pathology to the standardisation of cancer reporting.

As a discipline, cellular pathology represents a fascinating mixture of traditional methods and techniques, together with an ever-evolving role due to changes in other clinical specialties and the introduction of new technologies.

The specialty has become increasingly important to medicine, both in initial diagnosis and guiding patient management. While this has placed increasing pressure on our service that is sometimes difficult to manage, it has also made cellular pathology an even more interesting and fulfilling specialty to be involved in. Change within cellular pathology has accelerated over the last decade and we are now embarking on a very exciting period of further developments that will result in a modernised service, fit for the evolving NHS as we move forward over the next few years.

Key achievements

Immunohistochemistry

Immunohistochemistry entered diagnostic practice in the 1980s and is now a mainstream method in cellular pathology laboratories. The technique is based on the identification of characteristics of cells and tissues via a specific, immune-based interaction between a primary antibody raised in a non-human animal and the cellular or tissue component under investigation. Immunohistochemistry has become a cornerstone of many aspects of diagnostic practice, including the typing and subtyping of tumours and the identification of infective agents. Immunohistochemistry has also become increasingly important for the prediction of clinical response to cancer-targeted therapies.

Molecular pathology

Molecular pathology describes the very broad range of techniques that are primarily based on the investigation of DNA or RNA for many purposes, mainly associated with neoplasia. Some techniques can be performed on tissue sections mounted on glass slides. However, many techniques are centred on the examination of DNA that is extracted from fresh or formalin-fixed tissues. Almost all these methods rely on the ability to amplify DNA samples using the polymerase chain reaction (PCR). Kary Mullis, the inventor of PCR, shared the Nobel Prize for Chemistry in 1993 for this discovery.

Nowadays, molecular tests are essential for the initial diagnosis of many neoplastic conditions,

RETURN TO CONTENTS

Neil Shepherd

for instance, the identification of clonality in lymphomas and leukaemias, as well as for the determination of prognosis and the prediction of clinical response to an increasing range of cancer-targeted treatments. Molecular techniques are also used for other reasons, such as the identification of infective agents.

> Cellular pathology represents a fascinating mixture of traditional methods and techniques, together with an ever-evolving role due to changes in other clinical specialties and the introduction of new technologies.

Cancer datasets and tissue pathways

The quality and complexity of cellular pathology reports has increased dramatically over the last 30 years. By the mid-1990s, it had become clear that the amount of information in reports for cancer resections was variable. At the same time, research linking cellular pathology with patient outcomes was revealing an increasing number of features identifiable within tissue biopsy and surgical resection specimens that were important for accurate pathological cancer staging and other aspects of disease prognostication. The College recognised the need for detailed guidance on cancer specimen handling and reporting and commissioned the creation of a series of publications on an anatomical site-specific basis. These were initially called *Minimum datasets* but were later renamed as *Datasets for the histopathological reporting of cancers*, with the first appearing in 1998.

Over the subsequent two decades, the range of cancer sites covered by these datasets has increased progressively, such that there are currently over 40 datasets covering all major cancers. The publications comprise a detailed and fully referenced text providing guidance on all aspects of specimen dissection and block selection, together with one or more proformas that include all the required data items. Each dataset is also regularly updated by experts in the field such that new developments in clinical management, cellular pathology and molecular pathology are included as they become relevant to diagnostic practice.

> Biomedical and clinical scientists represent a key component of cellular pathology staffing. Within many areas of medicine, roles previously undertaken only, or mainly, by medical staff are now being performed by nursing or scientific staff.

Subspecialisation in larger centres

Until the 1990s, almost all cellular pathology departments were staffed by histopathologists and/or cytopathologists who were trained in all major organ systems and specimen types and whose routine diagnostic practice was across all major subspecialties, although they may well have possessed one or more areas of special interest and expertise.

During the 1990s, clinicians became increasingly subspecialised, with the days of the truly general surgeon and physician effectively over. In parallel with developments in medicine, the practice of cellular pathology was becoming more complex, which was reflected in the creation of the cancer datasets described in the previous section.

The concept of formal subspecialisation in cellular pathology developed initially in larger and usually academic departments. This would allow pathologists to focus on one, or a small number, of areas within diagnostic practice, facilitating the maintenance of up-to-date knowledge and the acquisition of specialist skills that were particularly pertinent to the most complex and/or unusual cases. This process has since become widespread within large departments and is also increasingly common within smaller hospital departments, once the number of histopathologists and/or cytopathologists exceeds the minimum required in order to make such an approach viable and sustainable.

Scientist input to complex specimen cut-up

The relentless increase in workload and specimen complexity within cellular pathology has led to increasing pressure on most departments in the UK. Despite initiatives to increase the number of medically trained graduates entering the discipline with the creation of histopathology training schools across the UK and increases in the numbers of funded training posts, many departments have become understaffed in terms of the required number of trained individuals to perform specimen cut-up and reporting duties.

Biomedical and clinical scientists represent a key component of cellular pathology staffing. Their roles have traditionally focused on assistance with cut-up, tissue processing, the preparation of tissue sections and both histochemical and immunohistochemical staining.

Within many areas of medicine, roles previously undertaken only, or mainly, by medical staff are now being performed by nursing or scientific staff. Training scientists to perform specimen cut-up and expanding this role to more complex cases, under the guidance of the medical staff, is a significant service improvement that has also created an interesting career pathway for this staff group.

RETURN TO CONTENTS

Key challenges facing cellular pathology

Digital pathology

The introduction of digital technology into cellular pathology is an exciting development that will bring investment into laboratories and create image-handling capabilities that will facilitate aspects of routine diagnostic work and many academic pursuits involving this discipline. Key challenges include ensuring that diagnostic accuracy is maintained during the introduction of digital systems. It will also be important that systems in different hospitals can interact and allow digital image transfer between departments. It is essential to ensure that changes in working patterns that could follow the introduction of digital pathology, such as increased working from home, are appropriately managed.

Multidisciplinary team meeting support

Multidisciplinary team meetings were introduced following the 1995 Calman–Hine report.[1] The concept was to ensure that the highest possible standard of care was delivered to cancer patients through formal involvement of every key discipline involved in their management. This principle has expanded throughout cancer and non-cancer care and has been an important means of ensuring that the best care is provided. Ensuring that these meetings are appropriately resourced and that pathologist input is streamlined where possible are crucial challenges.

> We are now embarking on a very exciting period of further developments that will result in a modernised service...

Molecular pathology

Molecular pathology is now a key component of modern patient care for the reasons described earlier in this article. Our main challenges include ensuring that the sometimes-complex administrative pathways involved in arranging these tests operate smoothly and that the pre- and post-test activities required of cellular pathology laboratories are recognised and appropriately funded.

Developing systems for cellular pathology

Laboratory information management systems (LIMS) across the UK are often relatively old-fashioned compared to the computer software available in other areas of modern life. Furthermore, procuring a new LIMS is almost always a protracted process. The development of the Carter report-inspired hub and spoke model for the provision of pathology services within the NHS will be greatly facilitated by the introduction of region-wide LIMS that allow secure data transfer between laboratories. Another challenge is ensuring that new LIMS support the latest developments within cellular pathology. For example, use of well formatted proforma-style reports, interfacing with digital pathology and robust systems for acknowledgement of results.

Facilitating funding

Cellular pathology has historically struggled to obtain funding to maintain and expand its service. There is a tendency for service users to assume that changes within their own disciplines will not affect the workload of cellular pathology – or to fail to recognise workload implications for our specialty. Key challenges include maintaining service-wide surveillance for new developments that may impact on cellular pathology and engaging with service users to ensure that these are recognised with an appropriate level of funding. The tighter integration of our specialty with patient pathways should help to raise the profile of cellular pathology and facilitate this process.

Securing sufficient staffing

The increasing workload of cellular pathology departments (in terms of both case numbers and complexity) has not been paralleled by a sufficient increase in medical, scientific and administrative staffing across the service as a whole. Marked differences in staffing levels exist across UK departments, with the smaller laboratories often least able to recruit and retain staff. Key challenges include securing funding to enable staff expansion and then successfully recruiting to fill vacancies. The introduction of digital pathology and regional LIMS should facilitate the geographical flexibility of service support to laboratories most in need of assistance.

Integrating scientists into reporting

Biomedical and clinical scientists are a key component of cellular pathology departments. Scientist-led support of roles

RETURN TO CONTENTS

traditionally undertaken by medically trained pathologists can provide valuable service support. Many departments have already integrated scientists into specimen dissection. Over 50 laboratories in the NHS are now training scientists to undertake microscopy and reporting, within defined areas of practice. Incorporating scientists into these tasks in a way that is most beneficial to the service is a key challenge. It is essential to approach this development from the point of view of positively determining what scientists can achieve and contribute. It is important to recognise that this development is similar to many initiatives involving non-medically qualified staff across the whole of clinical medicine, for instance nurse-led endoscopy.

Celebrating notable cellular pathologists

Juan Rosai

Juan Rosai is seen by many as the father of modern cellular pathology. He was born in Italy but undertook his medical degree and initial pathology training in Argentina. He worked in several high-profile positions at Washington University, the University of Minnesota, Yale University and the Memorial Sloan-Kettering Cancer Center in New York. He later returned to Italy, to the Istituto Nazionale dei Tumori in Milan. As his reputation as a surgical pathologist developed, he received accolades from many institutions including the International Academy of Pathology, the American Board of Pathology and the Royal College of Pathologists. His expertise as a generalist diagnostician was unparalleled – a skill that is now unlikely to be encountered in the era of increasing subspecialisation. He published over 400 papers, many of which contained seminal descriptions of new entities, especially in thyroid, thymic and vascular pathology. He was editor-in-chief of the third series of the *Atlas of Tumour Pathology* of the Armed Forces Institute of Pathology and an editor of the *World Health Organization Classification of Tumours* series. He is probably best known internationally for *Rosai and Ackerman's Surgical Pathology* – the most famous benchmark general text within cellular pathology. He was also a renowned teacher and mentor.

Basil Morson

Basil Morson was, and remains, the doyen of gastrointestinal pathology worldwide. He was born in London, served in the Royal Navy during the Second World War and later joined the Royal Naval Reserve. He studied for his medical degree and started his pathology training at the Middlesex Hospital Medical School in London. He gained MA and DM degrees at Oxford University. In the 1950s, he was the first to describe gastric-type metaplasia in the disease that became known as Barrett's oesophagus and undertook innovative work on intestinal metaplasia in the stomach as a precursor of gastric cancer.

Later, he started working with Dr Cuthbert Dukes at St Mark's Hospital, London, and was subsequently appointed as his successor in 1956. He was particularly attracted to Dr Dukes' work on surgical specimens of colorectal cancer. Basil was very influential in the development of the endoscopic biopsy and wrote seminal articles on the pathology of such material. Despite working as a single-handed pathologist in a small specialist hospital, he undertook much innovative research. He wrote important papers on the distinction of Crohn's disease from ulcerative colitis, authored the initial description of the biopsy appearances of dysplasia complicating ulcerative colitis and produced ground-breaking work on the concept of the adenoma-carcinoma sequence in the large intestine in the 1970s.

He was also an excellent administrator. He was Vice President and Treasurer of the Royal College of Pathologists and was also President of the British Division of the International Academy of Pathology and of the Sections of Proctology and United Services of the Royal Society of Medicine. He was the first pathologist to be the President of the British Society of Gastroenterology and his contributions were recognised in 1987 with the establishment of the Basil Morson Lecture, still the premier named lecture in gastrointestinal pathology. He established and co-authored *Morson and Dawson's Gastrointestinal Pathology*, still the flagship UK text on this subject, with the sixth edition to be published soon. He was the author of 11 other books, 20 book chapters and over 200 original papers. He greatly valued his interactions with clinicians and would often begin a lecture to trainee pathologists with the phrase, 'it is your job to control surgeons', intimating that one inappropriate word on a pathology report may induce unindicated major resections. In 1987, he was awarded a CBE for services to medicine.

Reference available on our website.

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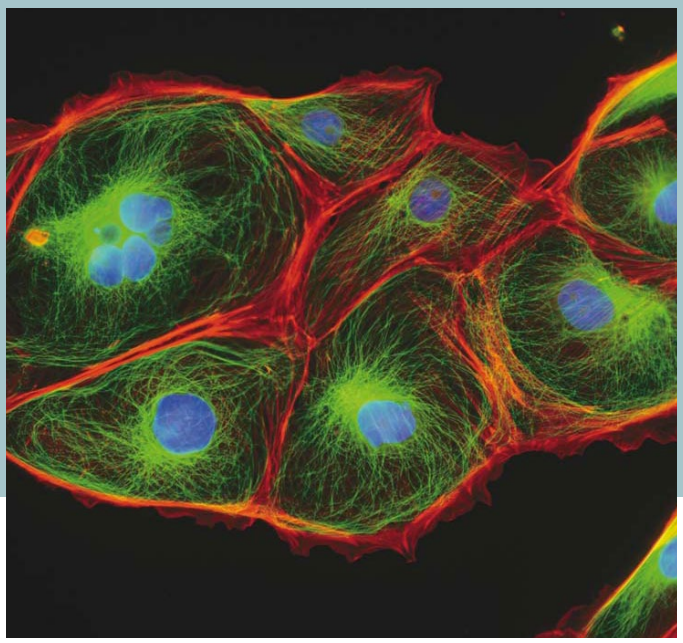
RETURN TO CONTENTS

CYTOPATHOLOGY



Cytology is the study of individual cells of the body. The human body is made up of millions of cells and these can be sampled and looked at under the microscope, after suitable preparation, to help diagnose medical conditions. Cytology is widely used in medicine for the prevention and diagnosis of disease. It is used on a daily basis to help diagnose cancerous and non-cancerous conditions of the respiratory, urinary and gastrointestinal tracts, as well as thyroid gland, salivary glands and lymph nodes to name but a few.

Dr Paul Cross

Cytopathology – the dark art that came into the light

In this article, Paul Cross introduces the field and discusses the significant developments in cytology, the challenges that cytopathologists face and highlights what the future has to hold.

"I will always remember a respiratory physician in a multidisciplinary team referring to cytology as one of the dark arts. I was amused at the time, thinking the term was some sort of compliment as it implied magic and a special talent. But, on reflection, I realise that this is how many cellular pathology trainees and some consultants also regard cytology. Why?"

– Dr Diane Hemming

Background to cytology

1962 – the year the College formed.[1] It was the year the Beatles released their first single, the year the polio vaccine was first devised and the year that the two superpowers of the USA and Soviet Union faced off over Cuba while the world stood on the edge of nuclear war. Very few of us now can recall that year or were necessarily even alive. And now, 60 years on, the Royal College of Pathologists is about to celebrate its Diamond Jubilee. Much has changed, but in other ways things have not. How has cytopathology changed over this time?

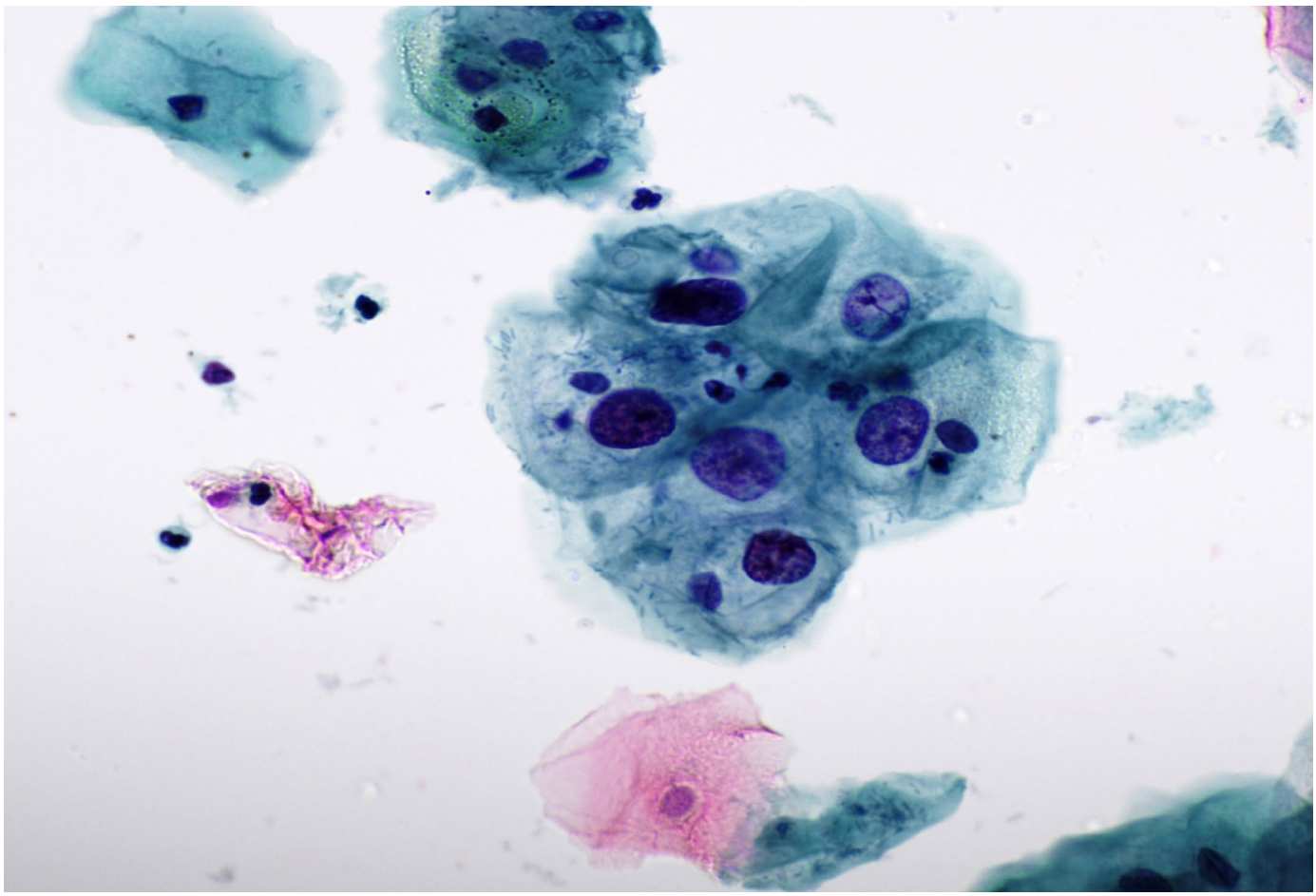
In 1962, cytology was part of the overall discipline of histopathology, largely as it is today. It was often separate from the main histopathology department and hence the two seldom met. There were enthusiasts but, on the whole, it was an add-on to the cellular pathology discipline where cytology consisted largely of fluids and sputum

"When I first started training and was faced with a cytology specimen I just did not know where to begin. They don't have the same underlying architecture as a histology specimen to provide some sort of starting point.

As I gained experience and started to get my eye into looking at a specimen, what amazed me about cytology was the fact you are able to come to a diagnosis with such a small amount of material and sometimes this material may be obtained by less invasive means than required for an equivalent histological specimen, which can be particularly useful for patients who are very frail and may not be fit for more invasive investigations."

– Dr Caroline Russell

RETURN TO CONTENTS



Cytology rests on good morphological interpretation, just as it always has.

samples. It was purely morphologically based and relied on good observational and interpretative skills. This is still the basis of good cytology today.

Historical approach to training

The ability to observe what is seen down the microscope, interpret the features seen and use this interpretation to arrive at a diagnosis has never changed. It is a core skill of cellular pathologists. Ancillary testing on cytology was a thing of the future. However, for many years and largely until the late 1980s, cytology was perceived by the majority of histopathologists as a dark art and was poorly used or taught. Cytology teaching was often done begrudgingly and invariably with the sole aim of passing the FRCPath Part 2 examination. Many candidates would do a two-week stint of looking at cytology sets pre-exam and expect to pass. Even I can recall being told in my own exam that cytology wasn't that important and that it was the surgical cases that really mattered.

> *"Cervical screening has always been about more than just looking at cells down a microscope – the professionalism of pathologists and others led to the enthusiastic adoption of a new technology, HPV primary screening, to improve cancer prevention."*
>
> – Dr Karin Denton

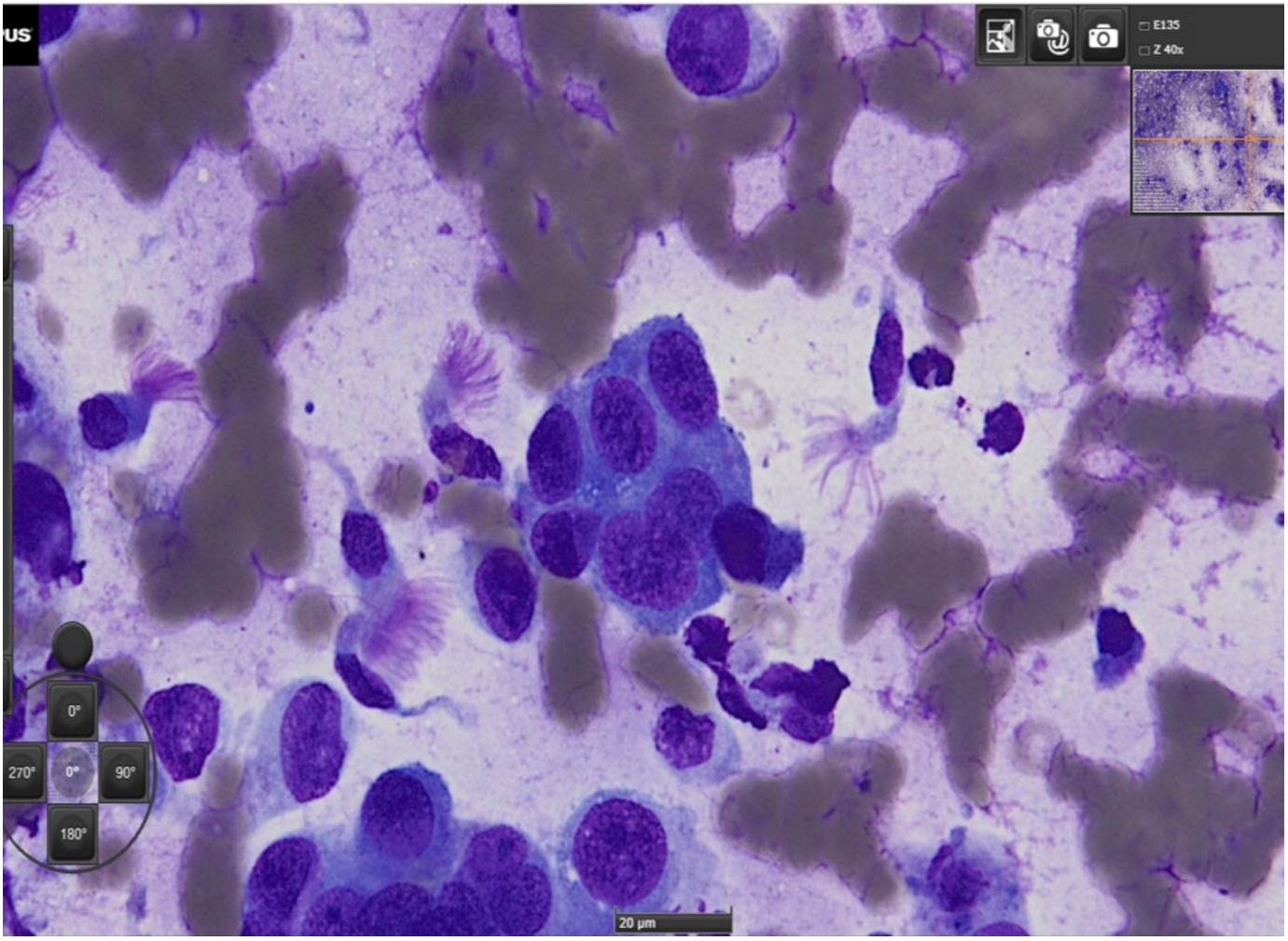
Developments in cytology

Cervical cytology

In many departments, cytology consisted of some diagnostic cytology (as we would call it now) but largely of cervical cytology. Following an unexpected upsurge in cervical cancer and its precursors in young women, the inadequacy of cytology training (medical and non-medical) and quality control was revealed, along with the poor uptake of cytological screening. Much was achieved by Sir JA Muir Gray and his National Coordinating Network for Cervical Screening, set up in 1985 – focusing on quality control of all aspects of the programme – and strongly supported by the British Society for Clinical Cytology (BSCC). Cervical screening is now well known to prevent around 2,000 cervical cancers per year in the UK.[2]

The introduction of an organised cervical screening programme (CSP) in 1988 brought about a huge increase in cervical cytology for reporting and, despite many recommendations and initiatives, many pathology departments were ill-prepared, or must not have been listening. This reached a crisis point with increasing backlogs. Although this was improving in the 1990s,

RETURN TO CONTENTS



Digital systems are improving, and allowing for cytology diagnostic use.

something had to be done. The setting up of the Conjoint Board between the RCPath and IBMS in 2001 and development of an agreed pathway for biomedical scientists (BMS) to obtain qualifications and recognition for the reporting of cervical cytology at consultant level was key.

The development of the Advanced Specialist Diploma in Cervical Cytology was among the first steps to the expansion of scientific roles, which demonstrated that classically perceived medical roles could be undertaken safely and just as well by others. These advanced roles are now so embedded that it is easy to forget this was only just over 20 years ago. This hugely important step paved the way for the establishment of the multitude of advanced roles that we see, not only in pathology, but across all of medicine.

Cytology as a diagnostic tool

Cervical cytology was invariably the mainstay of any cytology processed or reported in many laboratories and remained so well into this century. The role of diagnostic cytology (often called non-gynaecological cytology) was relatively minor apart from a few centres where enthusiasts were helping pioneer its use.

The development of the Breast Screening Programme in the late 1980s and beyond helped develop the use of cytology as a mainstream diagnostic tool. Many centres found themselves offering often daily breast fine needle aspirate (FNA) clinics, and this pre-operative diagnostic triple approach (along with radiology and clinical examination) replaced the use of intra-operative frozen section breast diagnosis.

While cytology was used in many other clinical settings, its use was more limited due to problems with sample collection and poor diagnostic yields.

"I have always believed cytology is an extension of cellular pathology, just another step down (or up) from a very small biopsy, and that all pathologists should be comfortable with reporting cytology. I think the best pathologists are those that can report both.

I have found that a knowledge of cytology has helped inform my histology diagnoses and that a working knowledge of histology has informed my cytology practice."

– Dr Diane Hemming

RETURN TO CONTENTS

> *"One of the biggest changes is what can be done on limited material and how cytology, which in the past was mostly a triage tool, now can provide the only diagnostic tissue. This is especially true in lung pathology, where an EBUS can produce a single cytology sample, which provides diagnosis, staging and molecular information allowing for personalised treatment for the patient."*
>
> – Dr Caitlin Beggan

The growing importance of good cytology sample collection, handling, preparation and lesion sampling became ever more appreciated and more widely performed.

Advances in sampling

With the transfer in breast screening from FNA cytology to core biopsy, there was a fear that many pathologists would turn their back on cytology again. However, advances in clinical medicine and treatment averted this. The growing use of radiologically guided cytology samples – especially in respiratory medicine with samples such as endobronchial ultrasound (EBUS)-guided FNA and the development of rapid on-site assessment to ensure a suitable sample had been taken and could be triaged appropriately – helped arrest this potential demise.

> *"The role of cytopathology has changed dramatically from being a poorly recognised 'fringe' subject to a vital diagnostic method, benefitting particularly from the collection of fresh, unfixed material for molecular and other techniques, allowing the immediate assessment of sample adequacy to decide what ancillary tests might contribute to diagnosis."*
>
> – Dr Amanda Herbert

Molecular techniques

Cytology is now well recognised as an excellent substrate for molecular testing. The huge opportunities presented by molecular analysis of samples rich in DNA/RNA that could be used to aid diagnosis and shape treatment has catapulted cytology from relative bystander to a front row seat. The ability to rapidly offer this information from a few hundred cells has shown how key cytology can be in modern medicine. The complete transformation of the cervical screening programme from conventional Papanicolaou cytology smears to a primary HPV molecular testing first, and reflex cytology if required, has shown how cytology and molecular techniques can be fully integrated into a seamless service, all geared to diagnosis and patient management on one sample.

This sort of change has led to a vast reduction in laboratories in the CSP from over 150 a few years ago to just eight in England, which is an apt demonstration of what can be achieved. Staff, service and laboratory configurations have had to undergo a huge transformation, all towards the aim of a better overall patient-centred service.

International standards

The development of standardised international reporting systems in cytology has encouraged a move away from the somewhat individualised and sometimes quirky reporting habits that could be difficult to interpret and act on clinically.

> *"After 60 years, we are increasingly learning how to use cytology, histology and molecular tools efficiently. This requires an adaptable and multiskilled workforce. It requires a workforce in which different skills are integrated within individuals and, at the same time, one which integrates different traditions and training regimes in the same clinical teams."*
>
> – Dr Anthony Maddox

The CSP has shown how a standardised cytology reporting system, with agreed definitions, can help in this respect. Diagnostic cytology has taken many years to develop and promote such an approach. Systems such as those used by thyroid,[3] urine (Paris), salivary (Milan) cytology and others are now here to stay.[4]

The challenges facing cytology

Workforce and training

There is still much variation in cytology training, teaching and service delivery. Some of this variation is historic and needs to be better based on science and needs of the service. A total of 84% of pathologists reporting cytology would class themselves as general cellular pathologists.[5] The improved integration of cytology with histology services and being more central to many cancer pathways has helped enormously in showcasing what cytology can offer and in whetting pathologists' appetites to deliver it.

But all is not rosy with regards to staffing. There are still many trainees, and trainers, who believe cytology is hard, and for some too hard. While pathologists may baulk at cytology on occasions,

RETURN TO CONTENTS

there are many of our BMS colleagues who wish to and can offer many aspects of this service, and this will grow. They are a key part of the laboratory and cytology team, and we will rely on them even more if pathologist interest wains. Pathologist training needs to better integrate cytology and histology; each has its uses and limitations. Just as radiologists are used to reporting across different radiological techniques (plain x-ray, CT, MRI, ultrasound scanning) so should pathologists be able to report upon histology and cytology with equal skill.

> *"More and more patients do not request extensive surgery and prefer chemotherapy, targeted therapies or limited resections. I am truly convinced that only small biopsies and cytology will be useful in the near future. Small biopsies/cytology will be to confirm and possibly type tumours, then look for molecular or genetic changes."*
>
> – Professor Beatrix Cochand-Priollet

Future technological developments

The future of cytology, like histology, will involve greater uses of digital systems for reporting, educational and training. Cytology samples are currently less suited to whole slide imaging, but this is improving with advances in computer technology, and familiarity with systems and their use, but also with more considered and efficient technical handling and preparation of specimens. The use of artificial intelligence is also developing, with some systems already in use in cervical screening programmes.[6] With time, this will no doubt also be used more frequently.

The future of cytology

The last 60 years have shown how cytology has moved from the dark into the light. The desire to do more and more with less and less will again show how flexible and well-suited cytology samples are to modern medicine. The increasing use of small biopsies and samples will require us to further develop and refine our skills. This will include not only the bed rock of cellular morphology but also a wider range of molecular and genetic testing. Will we be termed cytomolecularists in the future? I am very positive about the next 60 years for cytology and its place within the overall umbrella of cellular pathology, as are the many colleagues who have helped provide ideas and comments for this article.

Acknowledgements

I am indebted to many colleagues who have helped with this article, with the ideas, comments and quotes they have kindly provided. I would like to thank Drs Caitlin Beggan, Beatrix Cochand-Priollet, Ash Chandra, Karin Denton, Diane Hemming, Amanda Herbert, Tony Maddox, Caroline Russell, David Poller, David Shelton and Louise Smart.

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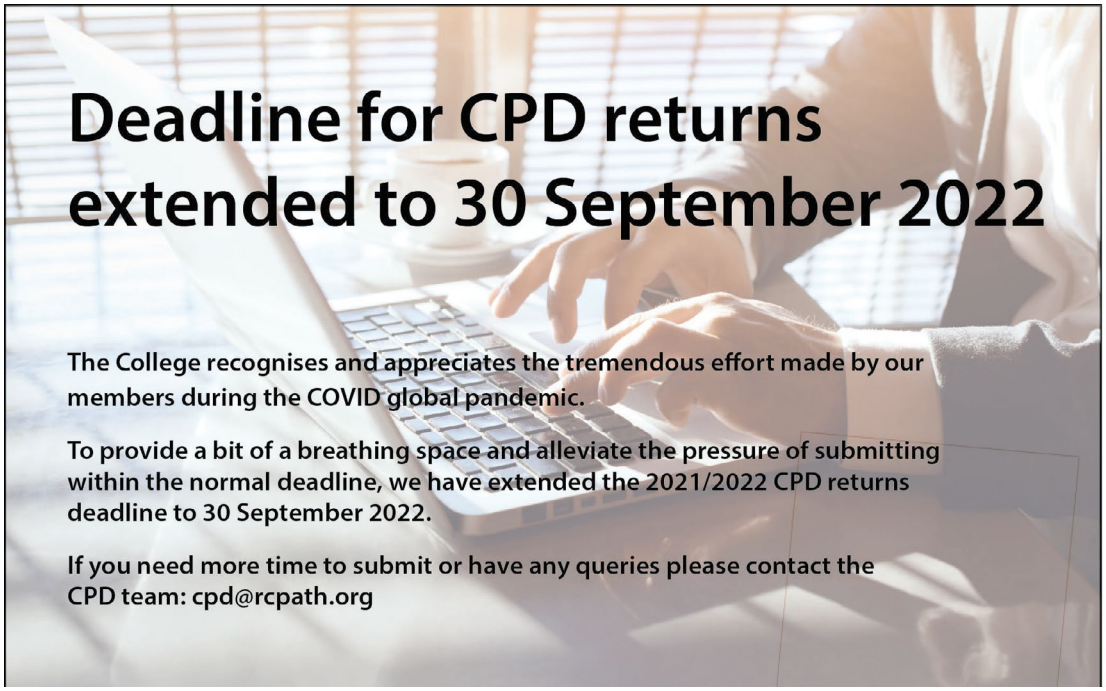
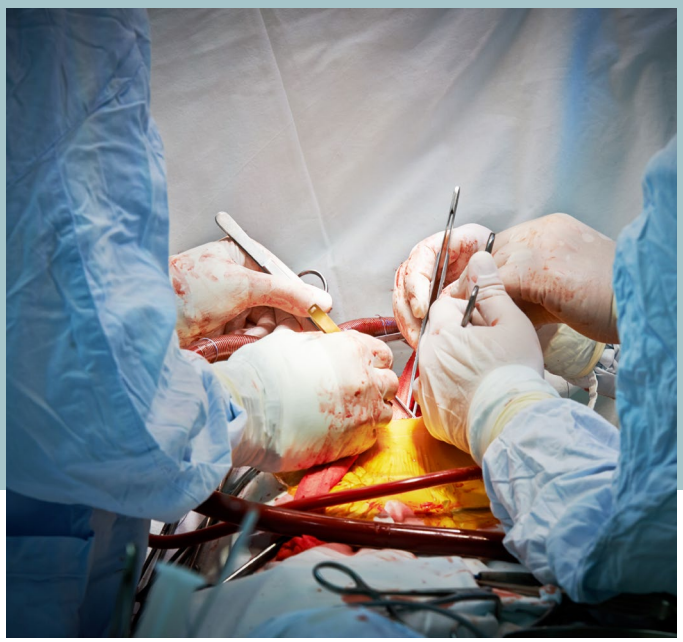


RETURN TO CONTENTS

HISTOCOMPATIBILITY AND IMMUNOGENETICS



Histocompatibility and immunogenetics is the study of tissue typing, most notably for the matching of organ and stem cell transplants. Scientists working in this specialty make sure that transplanted organs are compatible with the recipient to lessen the chances of rejection.

David Turner

Ann-Margaret Little

RETURN TO CONTENTS

Histocompatibility and immunogenetics is, primarily, the study of the human leukocyte antigen system, most notably for the matching of organ and haematopoietic stem cell transplants. Scientists working in this specialty ensure transplanted organs and cells are compatible with the recipient to reduce the chances of rejection and other complications. Here, David Turner and Ann-Margaret Little highlight the key achievements and advances in this specialty, as well as future challenges around optimising donor matching and digital pathology.

Background to the specialty

In common with all pathology specialisms, histocompatibility and immunogenetics (H&I) developed as a clinical discipline after many years of research. Pioneers of transplant immunology – legendary names in the discipline, such as Peter Medawar, Peter Gorer and George Snell – studied allograft rejection in animal models. They identified the central role of the immune response in the rejection process and the importance of polymorphic proteins encoded in a region of the genome designated the major histocompatibility complex (MHC). Others, such as Jean Dausset, Rose Payne and Jon van Rood, studied the phenomenon of leukocyte agglutination when using sera from multi-transfused patients or multiparous women. The targets of the antibodies identified were shown to be human MHC molecules, eventually named human leukocyte antigens (HLA). These various strands of research coalesced into the nascent discipline of 'tissue typing', which was able to support the new solid organ and haematopoietic stem cell transplant programmes starting in many countries from the 1960s onwards.

Over the last 50 years, many advances have been made in the field of H&I; the elucidation of new HLA genes and alleles, the development of assays for HLA typing and HLA antibody definition, and the approaches necessary for risk assessment at the time of transplant.

H&I labs are now involved in supporting many forms of solid organ and haematopoietic stem cell transplant as well as diagnostic testing (as many HLA alleles are associated with autoimmune diseases or drug hypersensitivities) and aspects of transfusion medicine. There are 23 H&I labs around the UK providing clinical HLA and human platelet antigen (HPA) and human neutrophil antigen (HNA) testing. They are staffed by biomedical scientists and clinical scientists, with a requirement for the laboratory head to be a Fellow of the Royal College of Pathologists.

H&I has been a separate discipline within the College for many years, thanks to the efforts of the scientists who led H&I labs in the earlier days of the discipline, such as Professor Phil Dyer and Professor Derek Middleton. They, and many others, pushed for H&I to be seen as a standalone discipline with

its own SAC and Part I and II exams. These efforts have led to structured training for staff working in H&I in the UK, which ensures continuity of support to service users as H&I continues to develop as a clinical science.

> H&I labs are now involved in supporting many forms of solid organ and haematopoietic stem cell transplant as well as diagnostic testing...

Establishing H&I as a College specialty

A recollection from Professor Derek Middleton PhD, FRCPath

"It was a struggle for H&I to gain recognition. At the time, it was a big bonus to be able to gain membership by research publications and I may even have been the first. Heather Dick, who was head of the lab in Glasgow, helped me a lot. It was not just a case of listing your publications. You needed to tell the story around them – how important the publications were, if they led to improvements in the lab, how they showed you could be head of the lab. It was easier for me because all my publications had been when I was in essence running the Belfast lab. There were several others who gained membership this way, including Bob Vaughan from Guy's and David Savage in Belfast.

However, when we first found out that 20% of College membership in those days were scientists (mainly biochemists), it was then I realised there was a home for us at the College. The difficulty in gaining membership via immunology as a scientist at that time though meant that we needed our own discipline."

A recollection from Professor Philip Dyer, OBE, PhD, FRCPath

"In the late 1980s, a scandal involving non-consensual *removal of kidneys for transplantation from living donors precipitated the Human Organ Transplants Act and its Regulations. Enshrined in the Regulations was the need for a genetic relationship to be established using techniques which existed only in H&I laboratories. The British Society for Histocompatibility and Immunogenetics (BSHI) had advised on these Regulations and had concurrently drafted a training programme covering these and other techniques in use to support clinical organ, tissue and cell transplantation.*

Several medical college members who had an interest in H&I, including Heather Dick, Rodney Harris and Richard Batchelor, were required by the College President, Peter Lachmann, to harmonise these developments within the College. Derek Middleton and I, who were at the time aspiring to become College members, were asked to join this initiative. The outcome was the establishment of the College H&I Sub-Committee, which was to report to both the College Immunology and Haematology Committees reflecting the cross-disciplinary nature of H&I. Richard Batchelor was appointed as the first Chairman and both myself and Derek Middleton were appointed to the Sub-Committee. We both gained College membership via the publications route. This Sub-Committee moved to establish a route to College membership by examination in H&I. The vast majority of candidates have been non-medical NHS scientists, which reflects the staffing structure within the discipline."

Key achievements

Lymphocytotoxicity

One of the seminal developments in the field of routine transplant immunology was the development, by Paul Terasaki and colleagues, of the lymphocyte microcytotoxicity test, utilised for HLA typing, antibody definition and crossmatching. Hyperacute rejection of transplanted organs was not uncommon in early kidney transplants and was known to be due to the presence of antibodies in the patient that reacted with histocompatibility antigens on donor cells. The development of the complement-dependent lymphocytotoxicity crossmatch, using patient sera, donor leukocytes and a source of complement, allowed an assay to be employed at the time of organ offer that could identify donor/recipient pairs that were at risk of severe rejection. Over time, this complement-dependent cytotoxicity (CDC) crossmatch assay has been modified to improve ease of use and sensitivity, but is essentially still in use in many labs around the world in its basic form for assessing risk at the time of transplant.

Flow cytometry assays

Another milestone relating to crossmatching was the introduction of protocols for the use of flow cytometry-based assays in the 1980s. These assays are more sensitive than CDC and studies soon showed that clinically significant donor-specific antibodies could be identified using flow cytometry, even when the CDC crossmatch was negative. The flow crossmatch was not universally rolled out upon its development, with many labs relying on CDC because of its ease of use and relatively inexpensive equipment requirements but, in recent years, especially as quicker flow crossmatch protocols and refinements to reduce background reactivity have been developed, it has become more widespread.

Virtual crossmatching

A final crossmatching development, pioneered in the UK by the Cambridge H&I lab, is the omission of the wet crossmatch in favour of a virtual approach in situations where a patient's HLA antibody profile is well characterised and a complete HLA type is

RETURN TO CONTENTS

available on the donor. In these cases, valuable time pre-transplant can be saved by immune risk assessment without the need for a full wet crossmatch. The virtual crossmatch is now used in most H&I labs in the UK.

HLA antibody testing

The introduction of kits for HLA antibody definition that use single HLA antigen targets has revolutionised the field of H&I. Until this time, assays for HLA antibody testing had, by necessity, used HLA targets (on cells, ELISA trays or fluorescent beads) where multiple HLA molecules were present on each target. As such, deciphering which antibodies were present in a patient serum was often a very complicated and resource-intensive undertaking. The introduction of semi-quantitative single antigen technology using recombinant HLA molecules allows the definition of a patient's HLA antibody profile in a matter of hours, facilitating virtual crossmatching and HLA antibody monitoring post-transplant.

> Over the last 50 years, many advances have been made in the field of H&I; the elucidation of new HLA genes and alleles, the development of assays for HLA typing and HLA antibody definition, and the approaches necessary for risk assessment at the time of transplant.

Polymerase chain reaction methods

Finally, application of polymerase chain reaction methods developed in the early 1990s to define the sequences of HLA genes allowed H&I scientists to understand the extent of the polymorphism that exists within these genes – the most variable within the human genome. This led to more successful transplants between unrelated individuals, particularly haematopoietic stem cell transplants, which require the highest level of matching to minimise life-threatening graft versus host disease responses.

Methodologies used to define the 'tissue type', or HLA type of a patient or donor have also evolved over many years. Broadly, the tests used for HLA typing have always split into those employed for batch testing samples and those used for rapid HLA typing, particularly for deceased donor HLA definition. In the early years, only serological typing was possible, but the advent of PCR allowed the development of several new methods; PCR using sequence specific primers (PCR-SSP) and PCR using sequence specific oligonucleotide probes (PCR-SSOP) were used extensively in UK H&I labs throughout the 1990s and 2000s. The advances through these technologies are a good illustration of the need for clinical labs and commercial partners to work closely together to develop new technologies. For example, PCR-SSOP developed from an in-house procedure that was laborious, temperamental and difficult to interpret to a reliable strip-based commercial product within a few years. Many labs now perform routine HLA typing using next and third generation sequencing (NGS, TGS) based methods, providing definitive HLA typing information to improve support for solid organ, haematopoietic stem-cell transplantation and diagnostic service users. For those old enough to remember serology typing, restriction fragment length polymorphism (RFLP) and forward SSOP testing, seeing the data generated from NGS is really quite incredible!

Key challenges facing H&I

Identifying optimum donors

The extreme polymorphism exhibited by HLA genes and the encoded proteins makes identification of optimum HLA matched donors for transplantation challenging. Much development work has recently focused on improving HLA matching using 'molecular matching', making use of the knowledge that HLA molecules are made up of a series of epitopes. This is seen as a move forward from the traditional use of antigen and allele level matching. However, studies are still ongoing to understand whether this change will improve outcomes for patients. Sensitisation against non-self HLA also adds to the complexity of the matching process. The identification of permissive (or acceptable) mismatches that increase the donor options for patients is an area that warrants deeper assessment. This work will include improving our understanding of pathogenic HLA antibodies versus those that cause minimal damage. We also need to gain improved understanding of non-HLA genes/proteins and associated antibodies that may also contribute to poorer transplant survival.

Sequencing techniques

The use of NGS and TGS DNA sequencing methods has improved the resolution of HLA types that are defined for patients and donors. Further improvements with single molecule sequencing will reduce ambiguities and time required to define a high-resolution type, which can then be applied to deceased donor testing, which needs to be resolved within four hours, allowing implementation of more precise matching algorithms.

Digital pathology

A key challenge in the field of H&I, as a smaller discipline that may have been a little overlooked in this regard, is making effective use of technology. This would allow results to be handled completely electronically, without the need for paper requests coming into the lab and paper reports going out. This is being tackled locally in labs with interaction

RETURN TO CONTENTS

with hospital IT departments and service users, but the complexity of HLA typing and antibody data can often mean that the challenge of transferring results electronically can be underestimated. Projects are ongoing, however. For example, H&I and microbiology labs are currently working closely with the Organ and Tissue Donation and Transplant (OTDT) directorate of NHSBT to ensure deceased organ donor data is sent electronically from all labs to OTDT to facilitate organ allocation without any risk of data being compromised during the reporting process.

Workforce

Finally, in terms of challenges, mention should be made of the continual work required to ensure we are able to train staff to work at all levels in H&I labs. As a very small specialty, we have had to develop many bespoke courses and qualifications and input into many new initiatives over the years to ensure we have the tools available to train staff at all levels. From the British Society for H&I (BSHI) Diploma, Institute of Biomedical Science Specialist portfolios, Scientist Training Programme (STP) to the RCPath exams and Higher Specialist Scientist Training, an army of staff have volunteered to develop courses, sit on committees and mark exams and essays. The challenge for us and, no doubt, many other disciplines, is to build in sufficient workforce resources to enable these professional roles to be undertaken in the future.

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Organ donation in the UK – going from strength to strength

Maria Ibrahim

Claire Williment

The landscape of organ donation in the UK continues to evolve. The October 2020 *Bulletin* featured a review article on organ donation. Since then, the world has undergone some remarkable changes – the field of organ donation and transplantation is no exception with some of the key developments highlighted in this article.

Changes in organ donation legislation

Over the last decade in the UK, there has been a significant increase in organ donation, with the number of donors increasing by 56%. The introduction of opt-out legislation is expected to increase this figure further. The opt-out journey started in 2015 with its introduction in Wales. It was then adopted by Jersey (2019), England (2020) and Scotland (2021), with Northern Ireland, the Isle of Man and Guernsey soon to follow. This tremendous legislative feat was undertaken with the help of multiple individuals and organisations. Overcoming the various logistical, legal and cultural barriers has made the organ donation community even more determined that the new laws should be fully enacted and an individual's decision to be a donor should be fulfilled.

Statistical impact of the new laws

So far, the full impact of the opt-out scheme remains to be seen. Statistical analyses are in progress and the numbers are being closely monitored. The data from Wales was compared with England from the time before donation legislation was introduced. For donors where death has been confirmed by neurological criteria, termed donation after brain death (DBD) donors, a steady upward trend in the proportion of families consenting to donation has been seen. This difference reached statistical significance as seen in Figure 1. Further multivariable analyses have indicated there was an increase in both DBD and donation after circulatory arrest (DCD) consent rates in Wales in the three years following the introduction of opt-out legislation, though the impact seen was not immediate.

> Over the last decade in the UK, there has been a significant increase in organ donation, with the number of donors increasing by 56%.

Based on the data from Wales, the statistical experts at NHS Blood and Transplant (NHSBT) have predicted, even with a moderate impact from the legislation, that donation and transplantation will increase with a possible 25% rise in transplants. The UK government was quoted in parliament to expect 700 more transplants per year (Figure 2).

RETURN TO CONTENTS

John Forsythe

The impact of COVID on donation

No update in any field of medicine would be complete without a mention of the virus that has, in some way, affected all our lives over the last two years. Organ donation and transplantation across the world have been significantly affected by COVID-19.

In late 2019, the world was made to pause in many respects and organ donation was no different. Predictably, there was an immediate initial dip in organ donation and transplantation rates in the UK and globally. The potential risks were initially unclear. Hospital surges and demands on intensive care units meant that transplantation services were temporarily halted in all but a few cases. Living donation transplants, with the added worry of the health risk to the donor, were halted. In retrospect, it is amazing that three UK transplant centres managed to remain open during the first wave of the pandemic.

New ways of working

Behind the scenes, however, activity was at a high level and the community was collaborating in a way that was not necessary, or even possible, previously. NHSBT led the drawing together of senior clinical and non-clinical managers, patient group representatives, lay representatives and commissioners from across the UK.

Regular (sometimes daily) meetings addressed problems as they arose, planned for the next wave of the pandemic and immediately enacted decisions that would have taken weeks or months in 'normal' times. International collaboration was strengthened with the implementation of weekly calls to enable rapid sharing of experiences. Through this cohesive working, the transplant community recovered and adapted to the changing times with remarkable agility and team working. Clinical teams joined forces and found ways to ensure that the gift of donated organs materialised into subsequent transplants.

Keeping morale high

These were testing times, but the shared purpose of the many donation and transplantation teams kept morale high throughout this period. Tribute must also be paid to the retrieval teams who continued to travel around the country to donor hospitals (where, of course, COVID cases were centred) to carry out the wishes of donors and their families. In the UK, centres worked together in a way that was never seen before, with patients transferring between centres and clinicians working around logistical barriers to ensure transplants still proceeded.

The altruism of donor families in this situation should also be celebrated. Families of donors demonstrated an astounding degree of care and compassion. Despite not being able to visit family members in hospital, record numbers of families consented to organ donation, reflecting the incredible generosity of human nature in times of hardship. Organ donation was brought to the forefront of our minds by unfortunate circumstances, but the way in which it was handled was truly humbling.

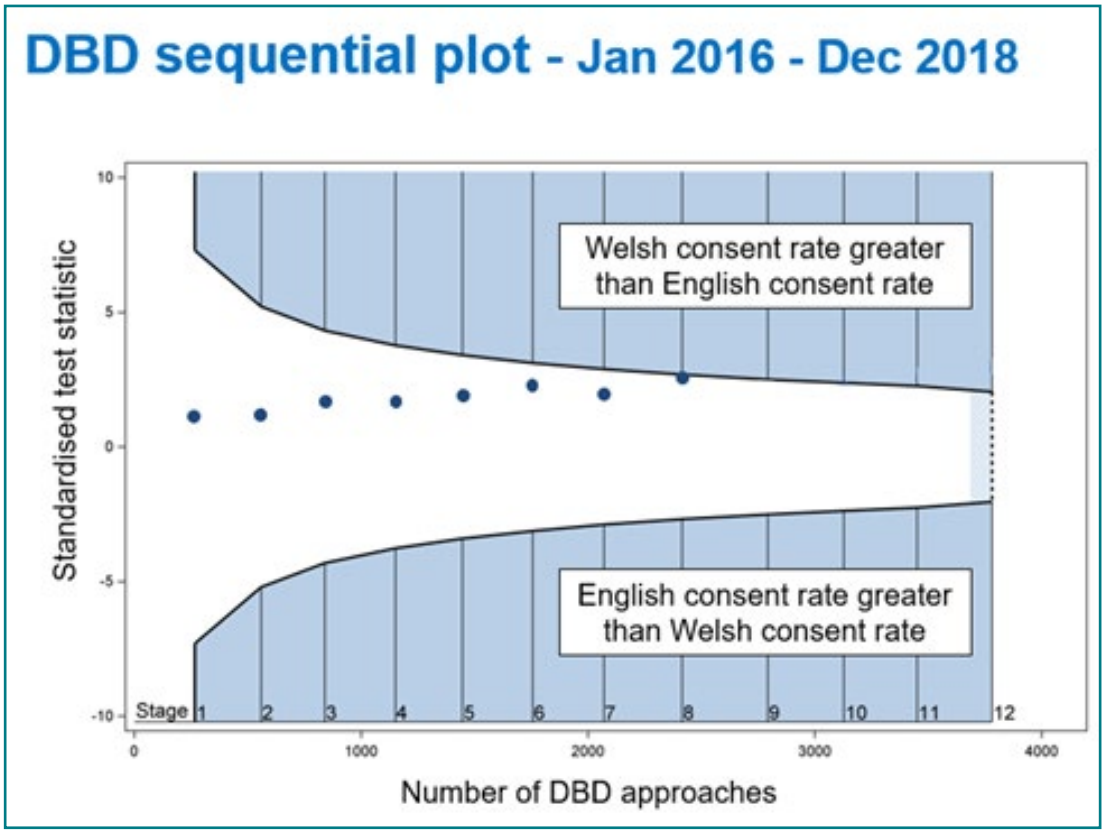


Figure 1. Sequential study design demonstrating DBD consent rates in England and Wales from January 2016 to December 2018. DBD: Donation after brain death.

RETURN TO CONTENTS

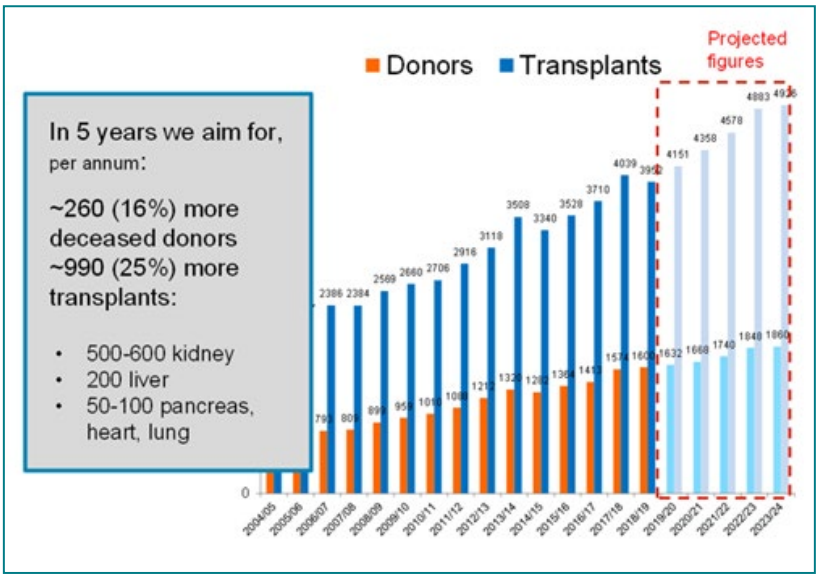


Figure 2. Predicted number of donors and transplants.

Rebuilding capacity

These efforts meant that transplantation rates soon recovered in a manner that was both swift and safe. Information and evidence were collected and collated throughout this period, so by the time the second wave of the pandemic hit, the transplant community was more informed and could respond to the situation with better clarity.

By the summer of 2020, all transplant centres were able to reopen, and deceased donor transplant rates soon recovered to pre-COVID levels (Figure 3). Living donor transplantation has now also recovered and the UK living kidney sharing scheme has resumed, with matching runs being equivalent to pre-pandemic activity in terms of numbers of donors, recipients included and transplants identified.

Transplant safety and COVID

Organ donation guidelines specific to COVID-19 have been developed and are ever-changing as new evidence emerges so donation and transplantation can proceed safely. To date, there is no known transmission of SARS-CoV-2 in the UK through donated organs.

The development of the COVID-19 vaccine has been an extraordinary medical accomplishment globally and the transplant community awaited the developments with interest. Transplant recipients were classed as vulnerable and were among the first to be vaccinated. Although effective in transplant recipients, the antibody response to the vaccine is less effective than in the general population.

To ascertain the extent of this, analyses have been performed on combined data from the UK Health Security Agency (UKHSA), the National Vaccine Registry and NHSBT Registry. Unvaccinated patients were found to be at significantly higher risk of severe disease if they contract SARS-CoV-2 infection in comparison with vaccinated patients.

A rare complication following immunisation with the ChAdOx1 nCoV-19 vaccine against SARS-CoV-2 is vaccine-induced thrombosis and thrombocytopenia (VITT). The consequences of proceeding with transplantation from donors deceased from VITT were closely monitored and UK guidance has been drawn up for the selection, recovery and transplantation of organs from donors with VITT, as well as recipient monitoring.

The importance of multidisciplinary working

Our colleagues in the histocompatibility specialty have also had to rapidly adapt and have been involved in vaccine efficacy trials. Reports of allosensitisation have been reported after vaccination, as has been the case with previous vaccines. There has been an enormous research effort in this area. Indeed, these colleagues have once again demonstrated that their expertise is essential to support timely decision-making in transplantation and the vital role that this service plays in organ donation and transplantation must be highlighted.

Those in histopathology who give opinions on biopsies of donor organs or abnormalities at the time of donation are increasingly important to the service when considering donors with increasing age, comorbidities, past history of carcinoma and potential infectious disease transmission. This information is often critical to proceeding with transplantation.

Changing attitudes to organ donation

As well as scientific progress during the pandemic, cultural advancements have also been made and many communities from different backgrounds have been brought together. For example, the introduction of opt-out legislation led to greater engagement with faith communities, with collaboration to improve community engagement and education regarding the organ donation process and address common misconceptions about the process. As part of the commitment to provide support for organ donation amongst communities, NHSBT has developed the Community Investment Scheme, which provides funding for trusted organisations to help drive awareness within communities.

NHSBT has also worked with faith leaders and communities to build trust, raise awareness and discuss the barriers to organ and/or tissue donation and how organ donation can proceed in line with faith or beliefs. As a result, as part of joining the organ donation register, a statement is now included which can be ticked regarding whether NHS staff should speak to family members about how organ donation can go ahead in line with an individual's faith or beliefs.

RETURN TO CONTENTS

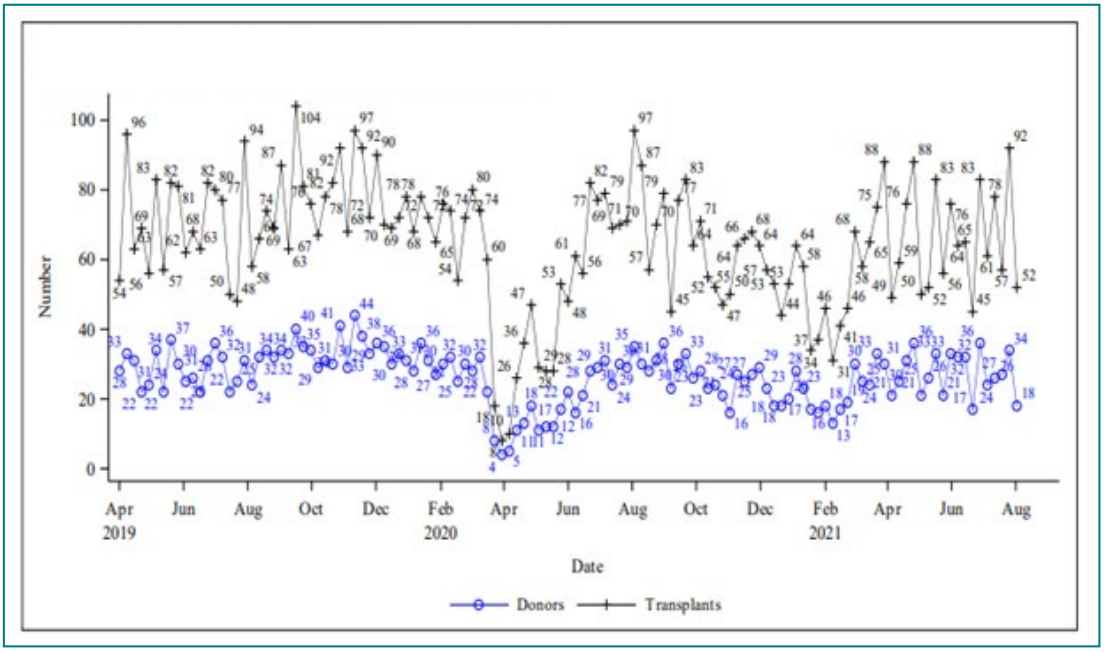


Figure 3. Effect of COVID-19 on deceased donation and transplantation. Number of deceased donors and transplants by week since 1 April 2019.

Improving transplant services

To help ensure that as many lives are saved as possible through the introduction of opt-out legislation, there is a new focus on improving transplantation services and organ utilisation. The Secretary of State for Health and Social Care has established a new Organ Utilisation Group to make recommendations on how to improve the transplantation system and reduce current geographic and ethnic inequities in access to transplant services. It is anticipated that this will lead to a revolution in transplantation services, in the same way as the Organ Donation Taskforce recommendations did for deceased organ donation services.

In addition, Clinical Leads for Utilisation have been established in all UK transplant units to identify and address local barriers to organ utilisation. There is also work underway to bring the organ donation and transplantation teams closer together and work collaboratively to ensure that there are no missed opportunities for successful donation and transplantation.

> The field of transplantation is a demanding one to work in ... but the rewards are immense in seeing the transformational power of the transplant procedure.

The future of transplantation

There is still a long road ahead in the future. Thousands of patients await life-saving and life-improving transplants, and much work is yet to be done to help reduce this number. The Organ Utilisation Group is providing focus and motivation to teams to deliver improvements – but we need to make sure this impetus is maintained.

The field of transplantation is a demanding one to work in. Unsociable and long hours make for a relentless work schedule, but the rewards are immense in seeing the transformational power of the transplant procedure. The workforce is dedicated and motivated. The next challenge is to maintain the enthusiasm, help prevent the widespread burnout that is affecting NHS workers as a whole and to entice young colleagues to join the organ donation and transplant community, and indeed to remain a part of it.

The UK drives innovation in transplantation and is a world leader in many aspects of the field including DCD donor transplantation. We are at the forefront of much of the novel research being conducted, for example, in machine perfusion techniques. On the horizon, the challenges that await us include ensuring that UK organ donation maintains the excellent standards that are currently being held and continues to deliver world-class healthcare.

Maria Ibrahim
Clinical Research Fellow
NHS Blood and Transplant

Claire Williment
Accountable Executive
NHS Blood and Transplant

John Forsythe
Organ Utilisation Group Deputy Chair
NHS Blood and Transplant

RETURN TO CONTENTS

Transfusion doctors and scientists are haematologists who specialise in transfusion medicine. They make sure that every patient who needs a transfusion is matched with blood from a suitable donor. They oversee the health and wellbeing of donors, the testing of blood for infections, the management of hospital blood stocks and promotion of the safe and appropriate clinical use of blood and components. Transfusion staff participate in and contribute to haemovigilance activities promoting patient safety.

Blood and Transplant Research Units – centres of research excellence to benefit patients and donors

Yomi Adegbaju

In this article, colleagues from NHS Blood and Transplant explain how the new round of joint National Institute of Health Care Research and Blood and Transplant Research Units will help achieve the aims and reflect the aspirations that underpin the work of their teams towards patient benefit.

Care, quality and expertise are the values that underpin the service that NHS Blood and Transplant (NHSBT) provides. They guide and inspire us to be the best in what we do. Our main ambition is to save and improve lives by delivering the priorities in the recently published corporate strategy.

NHSBT's strategy

One of our key priorities is to 'drive innovation to improve patient outcomes'. This builds on NHSBT's long and proud history of cutting-edge research and development. To remain world leaders in transfusion and transplantation, we will drive improvements by focusing our efforts on those innovations that offer the greatest potential to improve patient outcomes.

Genotyping is developing at scale and pace. We already use typing to match white blood cells, stem cells and organs to recipients. We now want to implement cost-effective, accurate, large-scale genotyping of red cell and platelet donors. By developing and adopting new genotyping technology, we will be better able to match blood for multi-transfused recipients, and organs and stem cells for transplantation.

More precise matching of red cells will ultimately lead to better clinical outcomes, particularly for patients who require chronic transfusion therapy. This will particularly benefit sickle cell patients who are at more risk of making antibodies against transfused red cells.

The gap between supply and demand for solid organs continues to grow. We will explore the use of organ perfusion technologies to maintain and enhance the quality of organs, improve organ preservation and increase organ utilisation. This will enable more patients to receive the transplant they need, especially if we can develop rapid, precise near-donor testing.

We also want to make it simpler and quicker for hospitals to get blood products to patients and reduce the risk of complication. We will do this

RETURN TO CONTENTS

by focusing our efforts on the development of universal blood components and whole blood.

Building and analysing new data sets to track and demonstrate the impact of our interventions will lead to better understanding and improved outcomes. We already do this successfully for solid organs and will build similar systems for people who receive blood or stem cells. We will use data to improve outcomes through:

- better matching blood donors and patients using genotyping
- developing the algorithms to match donors and patients
- undertaking clinical trials to show this works.

Investment in research and development will be critical if we are to remain world leaders in transfusion and transplantation medicine. We believe that, by providing resources for data, genomics and research and development (R&D), we can improve outcomes and reduce health inequalities.

> The gap between supply and demand for solid organs continues to grow. We will explore the use of organ perfusion technologies to maintain and enhance the quality of organs, improve organ preservation and increase organ utilisation.

Blood and Transplant Research Units

We can achieve our strategic and scientific goals by working with the National Institute for Health Care Research (NIHR) and others by investing in R&D and driving innovation into practice.

In April 2022, NHSBT launched five Blood and Transplant Research Units (BTRUs) across blood, organ, plasma and stem cells. The BTRUs, which are partnerships between NHSBT and leading universities, aim to provide new technologies, techniques or insights that will benefit donation, transfusion and transplantation. These BTRUs will be an important vehicle to bridge the gap between R&D and translation to clinical practice.

Many of the work strands in the new units could result in new technologies and practices that can then be delivered at scale by NHSBT, helping to save and improve even more lives. To maximise the value and impact from our research, we must also bridge the gap between our R&D and operational teams to accelerate the translation of innovation into practice.

Much of the work in the BTRUs will be aimed at reducing health disparities and improving access to new treatments, which aligns with NHSBT's corporate strategy and overall ambition to save and improve lives. The products could be manufactured at the latest NHSBT sites including major new centres such as the new cellular therapies laboratories in Barnsley and the forthcoming Clinical Biotechnology Centre in Bristol.

The BTRUs are funded by £16 million from the NIHR and £4 million from NHSBT, with research goals set to meet NHSBT's requirements, to be delivered between 2022 and 2027.

Precision cellular therapeutics

This BTRU was established in partnership with the University of Oxford, working in collaboration with the University of Birmingham and University Hospitals Birmingham NHS Foundation Trust led by Professor Ronjon Chakraverty.

The aim of this BTRU is to develop new kinds of cell therapies such as CAR-T for blood disorders and blood cancer, and improved systems for following up patients receiving treatment to better support their care. For example, it is important that patients from all communities benefit from cell therapies, therefore the team will seek to better understand how patients access the newer cell therapies and how they perceive the benefits of treatment. The team will also develop new digital technologies that improve care by enhancing interactions between the patients and their doctors and nurses.

NHSBT aims to improve blood and transplantation services with new research units throughout the UK.

NIHR | Blood and Transplant Research Unit in Data Driven Transfusion Practice at University of Oxford

NIHR | Blood and Transplant Research Unit in Donor Health and Behaviour at University of Cambridge

RETURN TO CONTENTS

Data-driven transfusion practice

This BTRU is partnered with the University of Oxford, working in collaboration with the University of Leeds, Queen Mary University of London, with Guy's and St Thomas' NHS Foundation Trust, and further hospitals led by Professor Simon Stanworth.

Blood transfusions save lives but must be used appropriately and like all medical interventions they carry a risk. Around 20–25% of blood transfusions are given outside of clinical guidelines. Data-driven approaches – using actual data at all steps in the transfusion chain – can offer ways to improve transfusion practice. One way the team hopes to achieve this is by working with hospital teams across the country to develop a linked electronic pathway between hospitals and from donors to patients receiving blood, to monitor and improve clinical use of transfusion.

Organ donation and transplantation

Led by Professor Michael Nicholson, this BTRU is jointly partnered with Newcastle University and the University of Cambridge.

The goal of BTRU research is to deliver a step change in understanding how best to deliver transplant services to the UK population, ensuring more people get the transplants they need and go on to live healthy and fulfilling lives.

The BTRU will test how modern perfusion machines, which keep organs alive outside the body, can increase the quality of organs available to allow delivery of new treatments to organs before transplantation and identify the best national system for delivering organ perfusion. It will also increase the use of organs by improving tissue-matching to enable transplants in difficult-to-match patients including women, those needing a re-transplant and ethnic minority groups.

Improvements will be sought in how long transplanted organs last and to improve recipients' heart health, so they live longer with a working transplant. The BTRU will also use cutting-edge technology to measure genes and proteins in donor organs to predict long-term individual outcomes. It will take the views of transplant patients and carers to identify the best ways of describing quality of life after transplantation. This will be invaluable in researching changes in practice that improve quality of life.

Donor health and behaviour

This BTRU is partnered with the University of Cambridge, working in collaboration with the University of Nottingham and the University of Oxford, led by Professor Emanuele Di Angelantonio.

The evidence base underpinning blood donation is underdeveloped. The research aims to improve the safety and efficiency of blood donation. The BTRU will conduct research to address major challenges identified by NHSBT, such as finding ways to encourage a more ethnically diverse range of people to donate blood, developing new methods for recruiting and retaining donors, promoting safe and effective donation practices, and identifying risks of adverse health effects of blood donation.

Genomics to enhance microbiology screening

Partnered with the University of Oxford, this BTRU will work in collaboration with University College London and the UK Health Security Agency, led by Professor Peter Simmonds.

This BTRU will evaluate and provide solutions for current threats to the microbiological safety of blood, organs and derived products used to treat patients. The team will see how new, large-scale genetic testing methods – collectively known as high throughput sequencing – can detect and often fully genetically characterise infectious agents present in patient and donor samples.

Blood donors provide a valuable cross-section of the adult population with which to pick up early signs of emerging infections in the UK. The team will use a donation bioarchive to test anonymised samples for novel pathogens using high throughput sequencing. The project will additionally link with surveillance programmes by public health organisations, potentially developing larger early warning systems in areas where viruses are detected.

Summary

Training PhD students, supporting patient and public involvement and engagement activities, and ensuring that research findings are translated into benefits for donors and NHSBT are integral to all the success of the BTRUs.

Dr Gail Miflin, Chief Medical Officer for NHSBT, said: '*By collaborating with academia, these five new BTRUs will help us to deliver on our mission to 'save and improve even more lives', and drive innovation to inform future clinical practice and improve patient outcomes.*'

To maximise the value and impact from our research, we will accelerate the translation of innovation into practice. The BTRUs will be an important vehicle for this in the longer term and, ultimately, deliver our vision of a world where every patient receives the donation they need.

Yomi Adegbaju
Head of Research Governance
Statistics & Clinical Research, NHS Blood and Transplant

RETURN TO CONTENTS

A closer look at the workforce cycle

Fiona Addiscott

Reshma Patel

Katherine Kean

The College Workforce team provides an important service to our members by contributing to identifying and resolving workforce issues and influencing government policy. This article guides you through the Workforce team's processes and plans for the future.

Who are the Workforce team and how do they support members?

Workforce Planning Manager, Fiona Addiscott, has worked at the College for 34 years and is the longest-serving member of staff. Fiona is passionate about workforce planning for pathologists and uses her experience to oversee the collation of workforce data and production of workforce reports, which are vital for the College's advocacy work.

Reshma Patel, the College's Workforce Coordinator, has worked at the College for over 22 years and manages the College's job description review service.

Through this service, the College provides recommended standards for appropriate working conditions, which are essential to ensure accuracy in reporting, reduction in the risk of error, enable high productivity, and improve the health and safety of doctors. Reshma is able to assist members on a wide range of workforce topics using her vast experience and knowledge.

Katherine Kean has worked at the College for four years as the Workforce Administrator. Katherine manages the selection of College representatives to sit on advisory appointment committees (AACs).

The AAC process ensures that employing bodies attract and retain the most appropriate candidates for the role, and vacancies are filled efficiently, benefiting other staff members already employed. Katherine organises training for new College assessors and we invite anyone interested in representing the College to contact her for further details.

How do we collect data now?

Workforce surveys are carried out by the Workforce team at the College, to provide further details on medical, clinical scientist, consultant-equivalent. specialty and associate specialty doctor, and trainee staffing levels in pathology departments. They aim to provide a realistic and up-to-date picture of the number of vacant posts in the UK in the different pathology specialties.

Scope of the surveys

These are baseline surveys that can be regularly updated to provide continuous information on how the workforce situation is evolving over time and whether specific issues are being adequately addressed. The results provide a snapshot of a specialty at a specific time. Specialties that have close links with specialist societies are encouraged to collaborate and, potentially, jointly badge surveys.

Survey recipients

The survey is sent to UK clinical directors and/or heads of department in the relevant specialty. They are asked either to complete the survey themselves or forward it to a designated representative.

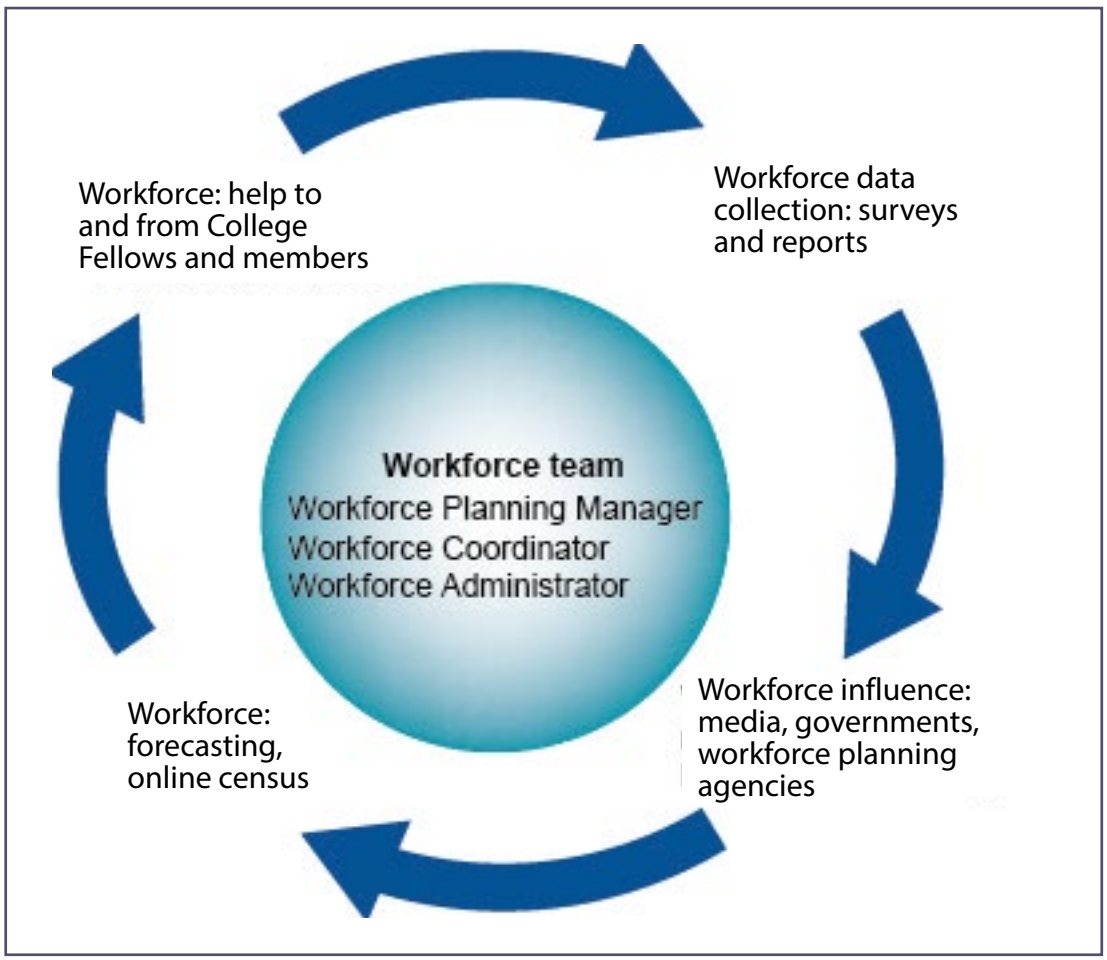
We encourage them to complete the survey by a deadline (usually they are open for two months) and we follow up with non-responders. Although the surveys are completed online, we do offer the opportunity for the survey to be completed in other formats.

It is recommended that the person completing the survey reads the questions before completing the survey since they may be required to collate

Box 1: Example workforce survey structure.
Section A: contact and workload data.
Section B: anonymised data on consultants in post (including their demographics), job planned sessions, vacancies, advertising posts and dealing with excess clinical demand.
Section C: staff, associate and specialist doctors, including job planned sessions and demographics.
Section D: predicted staffing requirements for the next two years.
Section E: number of locums, reasons for their employment and cost to the departments.
Section F: specialty-specific section asking questions relevant now.
Section G: free-text section to allow additional information to be provided.

RETURN TO CONTENTS

The Workforce team and how it operates.



data and answers. The questions are posted on the website prior to the survey going live.

Survey structure

The surveys are subdivided into sections (see Box 1), comprising questions that are a mixture of free text, select the best option and input specific numerical answers.

Survey results

Once the survey has closed, the Workforce Planning Manager checks the results and prepares the initial analysis of the data. The Specialty Advisory Committee (SAC) is asked to nominate an individual to work with College staff on the clinical interpretation of the results and to discuss issues with relevant stakeholders. This will enable the individual to produce a robust report on the current workforce in the UK. The data provided is used as aggregated statistics in the report and all data is anonymised.

Decision-making and resourcing for surveys

The Vice President for Professionalism and Assistant Registrar, in consultation with the Director of Professionalism and the Workforce Planning Manager, authorise survey questions and the report(s), referring more complex problems to the honorary officers. The relevant SAC is a major stakeholder in the survey, contributing to questions and advising on appropriate recipients.

How do we use the data?

Creating effective workforce reports

Once the survey results have been analysed, the SAC representative drafts the report content with assistance from the Workforce team. A brief introduction is used to highlight the importance of conducting surveys and provide information to lay audiences on the specialty and its impact on their healthcare. The SAC representative identifies themes and trends in the data that form the basis of the findings section of the report. If more information or data is needed to further inform the findings and the next steps, the SAC may commission case studies. Using the findings section, the SAC makes recommendations for how the College can support the specialty going forward to overcome the specific issues they are facing and suggests appropriate timeframes.

The production of the report involves several teams and individuals within the College, including the Publishing & Digital team who edit and review reports and provide graphics that complement the narrative. The Directors of Professionalism, Learning and Communications, the Vice President for Professionalism and the Assistant Registrar input into draft versions and have responsibility for authorising the report and referring issues to honorary officers.

RETURN TO CONTENTS

The final report forms part of the College's 'Meeting pathology demand' resources. The College uses these resources to draw attention to the issues facing pathology specialties and to push for policies that will effect change and help solve them.

Using workforce reports to influence government policies

In 2018, we published the Histopathology workforce census of the 2017 survey. Using this report and the statistic that only 3% of histopathology departments had enough staff to meet clinical demand, the College was able to successfully campaign for the creation of 30 additional trainee posts.

We published the Haematology laboratory workforce report in 2020. Our data and findings have been referenced in submissions to Health Education England (HEE) and the House of Commons Health and Social Care Select Committee, as well as in the British Society for Haematology (BSH) report.

In 2021, we published the Diagnostic cytopathology workforce report based on findings from our 2020 survey. The survey and report on diagnostic cytopathology practice across the UK was the first of its kind and has been circulated to relevant stakeholders to inform future training and exam requirements.

What is in the pipeline?

The Workforce team and the SACs are currently working on reports for veterinary pathology, virology, microbiology and neuropathology to highlight their recruitment issues. We encourage all recipients to complete the surveys and provide us with the data we need to advocate for you and your specialty.

Our future plans

We plan to set up pop-up questionnaires, collect qualitative data and utilise NHS England and NHS Improvement data to forecast the workforce situation, clinical demand and the level of vacancies in specialties.

Workforce team

Fiona Addiscott
Workforce Planning Manager

Reshma Patel
Workforce Co-ordinator

Katherine Kean
Workforce Administrator

Workforce volunteers – CPD credits awarded

The College attaches great importance to the duties of its assessors on Advisory Appointment Committees (AACs or interview panels); they act as our spokespeople regarding the adequacy of the candidate's suitability for the post.

College assessors nominated to sit on AACs play a vital role in helping us uphold the highest standards of pathological practice in all specialties.

One of the five core members of the committee must be an assessor nominated by the College. The assessor's role is to ensure that the recommended candidate or candidates are suitably trained to take up the post. The College assessor is usually the only external influence on an AAC.

In recognition of the College representative's role, the College's Professional Standards team has assigned 2 CPD credits to each AAC attended by the College representatives.

The Professional Standards team is also pleased to acknowledge the contribution our volunteers make to job description reviews and has assigned 1 CPD credit for each review carried out.

In addition, the College is offering training to attend an AAC. It is open to medical consultants and consultant clinical scientists who are established i.e. more than 3 years in a substantive post, undertaking CPD, have Equality and Diversity training, and would be interested in representing the College. The training has been assigned 1 CPD credit. If you are interested, please email: workforce@rcpath.org.

RETURN TO CONTENTS

Mythbusting: the roles of clinical scientists and SAS doctors

In these mythbusting articles, we want to dispel confusion around the roles of clinical scientists and SAS doctors. We highlight how the skills, qualifications and experience of clinical scientists complement medically qualified colleagues, and how those of SAS doctors set them apart from trainees. We also explain the College's role in reviewing and endorsing job descriptions and providing representatives on interview panels for both roles.

Clinical scientists

Introduction

'Clinical scientist' is a protected title, and all clinical scientists are required to be registered with the Health and Care Professionals Council before they can take up an appointment.

Consultant clinical scientists (CCS) are an essential force in improving healthcare.[1] They set evidence-based standards for laboratories and bring in new technologies and scientific methods to transform outcomes for patients. They also research and develop techniques and equipment to help prevent, diagnose and treat illness. While medically qualified consultants see patients in clinics, consultant clinical scientists run the laboratory and senior scientists supervise, interpret and sign out test results.

Training

As described by the National School of Healthcare Science,[2] CCS are trained to a high level of competence, combining years of scientific expertise and training in patient care. They oversee diagnosis of disease, lead services and guide a range of healthcare staff.

Healthcare scientists can first complete the Higher Specialist Scientist Training (HSST) programme to be eligible to apply for CCS roles. The HSST is a tailored five-year programme available to registered and experienced clinical scientists and biomedical scientists who wish to train and become eligible to apply for a CCS post. HSST programmes are available for a range of pathology specialties.

The programme is equivalent to the standards of training undertaken by postgraduate medical trainees, including gaining Fellowship of the RCPath by examination. Trainees can join the programme either as a direct entry (apply for a new post) or as an in-service entry (nominated by their current employer). For further information on the success of the HSST programme and its benefits, see Lisa Ayers and Professor Berne Ferry's article on pages 654–656.

In addition, senior healthcare scientists with equivalent qualifications and experience to HSSTs can apply to the Academy for Healthcare Science to join the Higher Specialist Scientist Register via an equivalence route.

Activities

CCS perform a range of highly specialist clinical, technical and scientific activities. They provide expert advice, opinions and training to their own and other professions in their specialist area of activity. They also undertake research and innovation in their specialist field with national and international impact. CCS may work exclusively in laboratories or, depending on the pathology specialty, some CCS direct patient contact in clinics and wards.[3]

These individuals help prevent, diagnose and treat illness using their knowledge of science and their technical skills. They use their expertise to help save lives and improve patient care in a supporting role or in direct contact with patients.[4]

The College's role in CCS job descriptions and interviews

The College provides a free service reviewing and approving job descriptions for consultant-level clinical scientist posts, and arranging for assessors to attend the advisory appointment committee (AAC) and provide guidance on recruiting the right candidates.

Our processes

This is a centralised service of reviewing and endorsing job descriptions. An experienced College staff member reviews the draft job description against the model job description. The model job description was created by the College, in

RETURN TO CONTENTS

Box 1: Qualifications required for specialist doctor and specialty doctor grades.*

A doctor appointed to the grade of specialist doctor:

- shall have full registration and a licence to practice with the General Medical Council (GMC) at time of appointment
- shall have completed a minimum of 12 years' medical work (either continuous period or in aggregate) since obtaining a primary medical qualification of which a minimum of six years should have been in a relevant specialty in the specialty doctor and/or closed SAS grades. Equivalent years' experience in a relevant specialty from other medical grades, including from overseas, will also be accepted
- shall meet the criteria set out in the specialist-grade generic capabilities framework.

A doctor appointed to the grade of specialty doctor should be:

- eligible for full registration with the GMC at the time of appointment
- have completed at least four years' full-time postgraduate training (or its equivalent gained on a part-time or flexible basis), at least two of which will be in a specialty training programme in a relevant specialty or as a fixed-term specialty trainee in a relevant specialty, or have equivalent experience and competencies
- appropriate experience in a pathology specialty
- MBChB or equivalent
- post-graduate qualifications in a pathology specialty.

*Note: non-UK-trained doctors should have equivalent experience and competencies.

The associate specialist grade was closed in 2008 and replaced by the specialty doctor grade. Many associate specialists will remain in that role until they retire. An associate specialist was a non-training career-grade post, which required ten years of medical experience after obtaining a primary medical qualification, of which a minimum of four years would have been in a relevant specialty.

conjunction with the Clinical Science Committee, and is used to:

- ensure the job description contains a proper balance of clinical, academic (where relevant), research and managerial activities
- check there is sufficient support and facilities to enable these activities to be performed
- make the job description more appealing to potential candidates.

Once we receive a job description, we provide initial comments and seek specialist advice, if needed. We then work with organisations to approve job descriptions within the times set out in our service standards.

We also provide a College assessor to attend the AAC. College assessors have a vital role on an appointment committee as a spokesperson who advises on the adequacy of a candidate's suitability for the post.

If you are interested in having a job description reviewed and endorsed and/or seeking a College assessor to sit on the interview panel (AAC), please email: workforce@rcpath.org.

References available on our website.

SAS doctors

Introduction

In February 2020, the College published its strategy[1] to support specialty and associate specialty (SAS) doctors working in pathology. The College recognises that those working in this grade are a vital asset to pathology services, providing a variety of services depending on their terms of employment.

SAS doctor is the umbrella term for a non-consultant career-grade doctor. These doctors were previously known as staff-grade doctors and the title was incorporated into the new specialty doctor grade in 2009. They are now grouped under the term SAS doctors, which refers to specialist doctors, specialty doctors, associate specialists, staff grades and other clinical career grades.[2]

SAS doctors are a diverse group of doctors with a range of skills and abilities. They are an essential part of the workforce and make up about 20%[3] of medical staff in England. (There are almost 20,000 doctors in the UK who are not on the General Medical Council's [GMC's] specialist register or in training yet fulfil the criteria of being SAS doctors.) However, there are fewer opportunities for SAS career progression compared with other senior doctors, and the development of SAS doctors is not always afforded the same attention.

RETURN TO CONTENTS

The College's SAS strategy, which was launched in 2020.

Benefits of employing an SAS doctor

Effective SAS doctor development leads to a more motivated and engaged workforce where every individual has the opportunity to work to their full potential, thereby equipping them with the skillset required to meet the needs of the service and improve patient care. Investment in the development of the SAS workforce should always be considered as a possible route to support local workforce plans and resolve skills shortage issues alongside output from national medical training programmes.

SAS doctors provide experienced and specialist care, often within multidisciplinary teams. This includes the management of complex cases and spending time and effort reflecting on and reviewing patient care activities so that quality and safety improve continuously. SAS doctor posts usually offer the opportunity to focus predominantly on providing direct patient care and less on the other clinical and non-clinical responsibilities required of a consultant or trainee. However, depending on their personal interests and experience – and the available opportunities in their Trust and specialty – SAS doctors are encouraged to become involved in developing local services, teaching, training, research and management, as appropriate to their skills and experience. SAS grades on the higher thresholds of their contracts may have acquired a high level of specialist knowledge and expertise and have the capacity and opportunity to work independently within agreed lines of responsibility. Many may also take a broader leadership role within their employing body.

Autonomous practice

Many SAS doctors already work as autonomous practitioners.[4] There are several benefits to encouraging and enabling autonomous practice, where appropriate, and these include:

- recognition of the high level of clinical skills and professionalism
- provision of personal and professional development opportunities
- the opportunity to have greater medical engagement
- support for the recruitment, retention and motivation of highly skilled clinicians
- improved governance and accountability.

SAS doctors can work autonomously in line with the Academy of Medical Royal College's Taking Responsibility: Accountable Clinicians & Informed Patients.[5] The British Medical Association (BMA) has produced a guide on autonomous working,[6] which includes a template[7] for the development of autonomous practice. Medical directors should ensure that local policies take account of this guidance and encourage SAS doctors to work autonomously and take up extended roles where appropriate.

Career development

For many SAS doctors, the option of pursuing specialist registration via another route is not appealing and they have made a conscious decision to enter the grade as an alternative career choice to becoming a consultant.[8] However, other SAS doctors are keen to apply to the GMC for a Certificate of Eligibility for Specialist Registration (CESR). Doctors who are successful in meeting CESR requirements also qualify for entry onto the specialist register of the GMC. They are then eligible to apply for a consultant post.

SAS doctors looking to apply for CESR certification have indicated that they face several obstacles, including accessing their College e-portfolio to record competence against the curriculum and matching competence attained during their career against the CESR competencies. In addition to helping with the CESR application process, access to e-portfolios can be beneficial for doctors collecting evidence to inform appraisal and revalidation. Trusts can support SAS doctors seeking to obtain a consultant post by aiding them through CESR.

References available on our website.

Fiona Addiscott
Workforce Planning Manager

Reshma Patel
Workforce Coordinator

RETURN TO CONTENTS

My personal journey to becoming an Associate Specialist in Histopathology in the UK

Delighted at becoming a Fellow of the Royal College of Pathologists, this account describes a highly personal journey of relocating from Saudi Arabia to the UK.

Dr Sujatha Balija

I landed in England on 16 January 1996, which also happened to be my 40th birthday. I arrived with a job offer for a locum lecturer post at the Royal Free University College London Hospitals. I considered this a reward for the hardship I endured during my tenure as a specialist pathologist in Riyadh, Saudi Arabia. I had been noticed by Dr Bacchus (International Collaboration Pathologist Lead) and was recommended by the then College registrar, Dr Julie Crow. A special mention of thanks goes to the research team led by Professor Price for his guidance during the research that led to several papers being published in international journals and poster presentations at various conferences during my sojourn in Riyadh in the early 1990s.

Coming to England as a sponsored candidate had various merits including ready completion of GMC registration without the need for language testing, with support from the College's educational directors, Dr Rinsler and later, Dr Platt. My initial temporary registrations and renewals were followed by a permanent work permit.

> Family always comes first, followed by the need to achieve an appropriate work–life balance...

Further education in pathology

Soon after, I decided to acquire further knowledge in the fields of histopathology, immunohistochemistry and molecular pathology and enrolled for an MSc with the postgraduate medical school at St Mary's Hospital, Hammersmith.

I was particularly delighted when Professor Stamp, my personal tutor, commented that I was an outstanding student, commending my work on the prognostic factors of breast cancer. Professor Wright, my thesis supervisor, further commented on my clinical knowledge, which I savoured with much delight. During my studies, my interactions with many eminent professors and teachers would become beneficial in shaping my career. Some of these include Professor Thomas Kraus, Professor Wigglesworth, Dr Cook, Professor Massimo, Dr Hasserjan and Dr Witherspoon but there are many others.

The day I graduated with my MSc degree also happened to be the day of Dr Wigglesworth's retirement as a perinatal pathologist and he noted that I was going to be his last student at Hammersmith. He also gave me a signed copy of his book on perinatal pathology that remains a special gift and subsequently also signed by his co-authors, Professors Nick Wright and Sir Collin Berry.

> I fondly remember the first datasets released for colorectal cancer. I passionately filed them after my reporting of colorectal cancers and until this date, these tasks are part of my daily activities.

RETURN TO CONTENTS

Sujatha celebrating her Fellowship with College President Professor Mike Osborn.

My career as a pathologist

I then moved to the Royal London and Bart's Hospitals in an specialty registrar-grade post as an honorary clinical attachment passing the Part 1 of MRCPath in the spring of 2002 in my first attempt in the old system of essay writing.

Nowadays, these examinations have been updated to a multiple choice and short answers model. Dr Brown and Professor Sir Colin Berry were my seniors and Professor Jo Martin, Dr Mike Sheaff and Dr Dodd were some of the young consultant supervisors at the Royal London Hospital.

> I feel that I have achieved success at the age of 66 during the final leg of my professional career. An important lesson I learned by playing sports from a very young age was that I should remain satisfied irrespective of being a winner or runner-up.

I fondly remember the first datasets released for colorectal cancer. I passionately filed them after my reporting of colorectal cancers and, to this day, these tasks are part of my daily activities.

When I was appointed to an honorary international pathologist position at the Liver-Renal unit at King's College Hospital London under Professor Bernard Portman, I enthusiastically involved myself in all explant liver dissections as a solo assistant pathologist learning to report biopsy cases during a four-month period.

A telephone conversation with Professor Sloane piqued my interest with an offer for a locum appointment for training position at Liverpool. I joined the post by meeting Professor Foster, only to realise that Professor Sloane had recently passed away. However, I was involved with Professor Sloane's ductal carcinoma in situ protocol pro forma for research purposes, which I worked on for many years until I moved to my subsequent substantive post.

A steep learning curve followed as I undertook several case reports, most notably laryngectomy specimen dissections for cancer, with Professor

RETURN TO CONTENTS

Helliwell as my educational supervisor. The datasets were the outcome for the Wipple's dissections, reported with Dr Campbell who was extremely pleased with my reporting style for a gastric heterotopia in a rectal biopsy case. During this time (2001–2002), I attempted my MRCPath Part 2 while at Liverpool and Aintree.

I was provided a good working opportunity at Warrington General Hospital as an associate specialist. During this time, I avoided exams for the benefit of my work–life balance and to support my son pursuing his engineering course at the University of Liverpool.

> Lifelong learning is the motto for my success in my profession.

A few years later, I heard of an opening at Ashford and St Peter's Hospital (ASPH) in Surrey and was selected for the position by the pathology director, Dr Andrew Laurie along with the RCPath representative Dr Baithun. My career then took a different turn under the leadership of Dr Laurie, who was also my appraiser for almost four years and I started enjoying all areas of practice in histology, cytology and autopsy.

The ASPH Trust has been very supportive of me as I work on appraisals and revalidation, along with professional and personal development with particular thanks to the Trust and pathology senior management teams and my fellow consultants, who always greet me with great cheer in multidisciplinary team meetings.

The past five years at ASPH have been a period of many changes, alongside the changing needs of the profession and my final exams to achieve FRCPath qualification (during the COVID-19 pandemic) along with international candidature admission. Special thanks go to Professor Jo Martin and Mike Sheaf, my previous work supervisors, and Dr Adrian Bateman for being an excellent examiner.

Final thoughts

I feel that I have achieved success at the age of 66 during the final leg of my professional career. An important lesson I learned by playing sports from a very young age was that I should remain satisfied irrespective of being a winner or runner-up. The best support I have received is from my family, my spouse Mr Sridhar Reddy and my children.

One of the biggest takeaway messages from my journey is that the family always comes first, followed by the need to achieve an appropriate work–life balance. Personal achievements are not time-bound and age is no matter when you strive hard to achieve success. Lifelong learning is the motto for my success in my profession.

Dr Sujatha Balija
Associate Specialist in Histopathology
St Peter's Hospital

RETURN TO CONTENTS

Introducing Katherine Timms: our Director of Professionalism

Katherine Timms

Katherine Timms is Director of Professionalism at the College and oversees the Clinical Effectiveness, Professional Standards and Workforce teams. Katherine also manages the College's work on equality, diversity and inclusion (EDI) and is Co-Chair of the College's EDI Network.

Background and expertise

Katherine joined the College in 2021 from the Health and Care Professions Council (HCPC) where she led the organisation's work on standards, policy and guidance development, performance, equality, diversity and inclusion, and insights and intelligence. Katherine also sat as a non-executive director on the International Network of Physiotherapy Regulatory Authorities (INPTRA), supporting the global community in developing the profession and, in turn, patient safety. Prior to her role as Head of Policy at the HCPC, Katherine worked in fitness to practise policy at the General Medical Council (GMC) and in grant funding at Cancer Research UK.

Katherine has a keen interest in improving and assuring patient safety and has developed strong standards, policies and guidance to inform the work of healthcare professionals in this regard. Katherine is also very committed to supporting the health and wellbeing of healthcare professionals, having managed the GMC's vulnerable doctors review and initiated and led work at the HCPC to research, develop and establish its first Registrant Health and Wellbeing Strategy and action plan. Katherine sits on several study stakeholder and steering groups for National Institute for Health and Care Research (NIHR)-funded research to support improvements in patient care and professional wellbeing.

Plans for Professionalism

The Professionalism directorate has one key function – to support members in assuring patient safety. We do this through three key areas of work: clinical effectiveness, professional standards and workforce. We recently recruited a new Member Engagement Manager who will develop our work in this area.

The Clinical Effectiveness team delivers robust, evidence-based, National Institute for Health and Care Excellence (NICE)-accredited guidelines for pathology practice, which have more recently been supported by introductory webinars with the guideline authors. The team promotes continuous quality improvement and audits, and manage the College's key performance indicators. The team also ensures pathology input to relevant NICE consultations.

The Professional Standards team maintains the College's continuous professional development (CPD) portfolio used by around 90% of our members and accredits CPD courses to ensure a high quality of training is maintained for pathology. The team manages the College's invited review service, and is also currently helping to establish appropriate UK-wide oversight and governance for external quality assurance of laboratories.

The Workforce team's key role is the collation and analysis of workforce data to ensure the College's lobbying work is well-informed and results in the appropriate resources being allocated to pathology. The team also provides NHS employers with model job descriptions, along with a consultant job description review service and College representation at advisory appointment committees (AACs). These two areas of work help to ensure appropriate standards are maintained in the recruitment and selection of pathologists.

Katherine said: '*The Professionalism directorate could not deliver this fantastic work without the contribution of members who volunteer their time to work to complete surveys and act as authors, expert advisors, job description reviewers and AAC representatives. I am very grateful to all members who engage with these areas.*

The Professionalism function, and the wider College function, is to deliver strong services to members. As we look to the future we need to be more innovative and creative in the development of our member services.

A key focus for 2022 is to amplify the College's work on member engagement. I want members to have more opportunities to meet us, share views and shape the future of the services the College provides them with. We have an exciting

RETURN TO CONTENTS

programme of work planned for the coming year and I'm looking forward to it.

Another exciting area of work is the review of our approach to the collection and analysis of workforce data. Working with the Assistant Registrar, Dr Stephen Morley, we are remodelling our approach to ensure we are establishing the intelligence we need to support the future of the pathology workforce.'

EDI network

Katherine gained significant experience and insight into EDI leadership during her time at the GMC, being lucky enough to work with the former Head of Diversity, Andrea Callender. Katherine took the knowledge and skills gained at the GMC to the HCPC where she established the HCPC's first EDI policy, strategy and action plan, and developed guidance and training for staff on reasonable adjustments.

Katherine also established the HCPC's EDI forum, bringing together those with expertise, interest and lived experience in EDI matters to provide advice, raise awareness and have a voice in the development and delivery of policies and processes at the HCPC.

Since joining the College, Katherine has developed the approach of the College's EDI Network and is currently finalising the College's first EDI member survey to better understand member characteristics and barriers to engagement. Later this year, the College will publish its first EDI action plan that seeks to improve equity and fairness and ensure diversity and inclusivity.

Katherine said: *"None of us is an expert on EDI; we are all on a continuous journey of learning. For me, the most important elements of any work in this area are listening, showing empathy and understanding, and being prepared to challenge our views where necessary. I want to foster a culture in which people feel safe to share their experiences, and facilitate respectful and supportive discussions, wherever someone is on their journey.*

I think there is much for the College to do to understand the diversity of its members, and address barriers, and I'm excited to work with members and staff to help us achieve this."

Katherine Timms
Director of Professionalism

Helping with pathology recruitment

Job descriptions

The College's Workforce team reviews and endorses consultant-level and specialty doctor (SAS) job descriptions for medical and scientific posts across all pathology specialties for NHS Trusts, Foundation Trusts and other employing bodies.

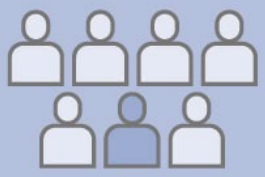
846

Number of job descriptions reviewed and endorsed over 2019 and 2020

College assessors

The Workforce team arranges for College-nominated assessors to attend interview panels (AACs) as an independent assessor to advise on the candidates' suitability for the post.

For NHS Trusts, this process contributes to the statutory framework governing the appointment of consultants.



507

Number of assessors that attended an advisory appointment committee (AAC) on behalf of the College over 2019 and 2020

If you are an NHS Trust or other employing body you can request a job description review or source a College assessor. Please contact the Workforce team at workforce@rcpath.org

RETURN TO CONTENTS

The Biomedical Scientist Empowerment, Education and Discussion Group: Improving access to education for laboratory professionals in blood transfusion

Danny Gaskin

Selma Turkovic

Anas Nasir

To improve training and education during lockdown conditions, a group was set up to provide virtual learning opportunities in transfusion. The group now successfully offers lectures to thousands of clinicians, nurses and students across the UK and internationally.

New challenges

At the start of the SARS-CoV-2 pandemic, the implementation of stringent infection prevention and control measures, including social distancing, created a significant challenge to maintaining training and education for Continuing Professional Development (CPD) for laboratory professionals working in the field of blood transfusion.

Many transfusion practitioners were redeployed with laboratory staff split into smaller teams to prevent whole departments going into isolation. Conferences, education days and networking events were cancelled or postponed.

Existing challenges and recommendations

The 2019 SHOT Report[1] stated in Recommendation 2 that there is an urgent need for education of staff in the laboratory as the 'standard of transfusion knowledge and education within laboratories is becoming a prevalent source of error'.

The Transfusion 2024 Report[2] – compiled in a joint symposium by the National Blood Transfusion Committee and NHS Blood and Transplant (NHSBT), with support from NHS England and Improvement – reiterated the role of transfusion laboratories 'to ensure that a trained and competent workforce is in place to support the needs of patients across all clinical disciplines'.

The NHS Long Term Plan[3] emphasises a skilled and trained workforce, while fully supporting the principles of the NHS Patient Safety Strategy,[4] namely promoting a safer culture and systems for the benefit of patients.

However, the scientific transfusion community has highlighted that CPD opportunities for laboratory staff are too few with action needed to try and address these shortfalls.

The group

Launched in September 2020 by the Patient Blood Management Team at NHSBT in collaboration with the London Regional Transfusion committee, The Biomedical Scientist Empowerment, Education and Discussion Group (BMSEDG) welcomes registrations from biomedical scientists and laboratory staff with an interest in blood transfusion with the aim to provide free access to virtual transfusion training. The membership became so popular that it now reaches out not only to biomedical scientists, but also to transfusion practitioners, medical staff, registered nurses and students of all disciplines with an interest in blood transfusion.

Since the first meeting, over 2,200 registrations to the BMSEDG have been received. The geographical distribution of the membership spans the whole of the UK, as well as representation from overseas.

The meetings take place monthly, where a subject matter expert is invited to deliver a lecture on a pertinent area of blood transfusion, before opening the session for discussion between delegates and speakers. The teaching content considers key industry recommendations such as those from the Serious Hazard of Transfusion (SHOT) haemovigilance scheme, the UK Transfusion Laboratory Collaborative (UKTLC), as well as significant events such as the 2022 Medicines and Healthcare Products Regulatory Agency's (MHRA) Central Alert System (CAS) alert on preventing

RETURN TO CONTENTS

The group was awarded by the Academy for Healthcare Science for their work.

transfusion delays in bleeding and critically anaemic patients. The content planning is also guided by use of feedback and evaluation provided by attendees.

By operating remotely, social distancing-related limitations have been eliminated and those who may have not otherwise been able to attend owing to distance, travel and time constraints are now able to benefit from being a member of the group.

Education

As of May 2022, there have been 18 education sessions delivered by 15 subject matter experts over 19 months.

To date, the BMSEDG has delivered education on a wide range of transfusion science and laboratory practice subject matters, including commonly requested subjects such as antibody identification, and less common but increasingly pertinent subject matters such as the implications of gender and sex on transfusion.

Impact on service users and patients

The BMSEDG sessions are provided free to delegates. Delegates are asked to complete an evaluation form to receive a certificate of attendance that can support a reflective writing exercise for CPD. A total of 785 delegates gave the sessions a mean average rating of 4.6/5 when asked 'how useful do you find the sessions?'

After the first six sessions, attendees were surveyed to evaluate the impact of group. Of those that responded, 62.5% felt that training time in their own departments had been reduced or was difficult to facilitate during the last 12 months owing to the SARS-CoV-2 pandemic. Almost all (98.61%) respondents felt that the education provided during these sessions enabled them to provide a better service to patients and service users.

Recognition

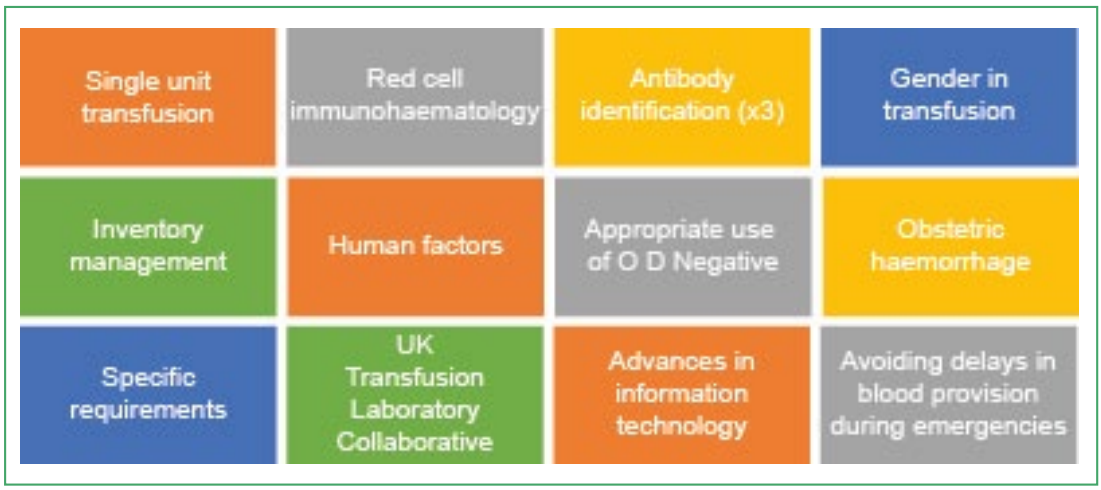
The BMSEDG was awarded the Academy for Healthcare Science Award for Inspiring the Healthcare Science Workforce of the Future at the UK Advancing Healthcare Awards 2022 in London in April.

The UK Advancing Healthcare Awards recognise and celebrate the work of allied health professionals, healthcare scientists and those who work alongside them in support roles, leading innovative healthcare practice across the UK.

The judging panel commented that '*the innovation was beautiful in its simplicity and was able to demonstrate a clear impact to colleagues working within NHSBT, the NHS and other transfusion laboratories, which not only supports education of their colleagues, but also patient safety*'.

Co-founder, group representative and NHSBT Patient Blood Management Practitioner, Selma Turkovic, was awarded the best abstract submission prize at the 2021 SHOT Symposium for her work titled *Maintaining a Continuous Programme of Support and Education for Hospital Transfusion Laboratory Professionals During the SARS-CoV-2 Pandemic*.

Some of the topics studied in the BMSEDG sessions.



RETURN TO CONTENTS

Transferability and wider application

This simple, widely accessible, low-cost and successful model will hopefully be considered by other organisations and specialties to enhance individual and service performance and to provide a platform for regular CPD for their staff members.

References available on our website.

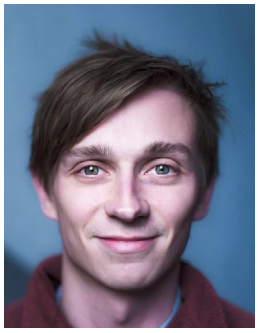
Danny Gaskin
Biomedical Scientist and Patient Blood Management Practitioner
NHSBT

Selma Turkovic
Biomedical Scientist and Patient Blood Management Practitioner
NHSBT

Anas Nasir
LIMS Analyst & Specialist Biomedical Scientist
Viapath Analytics, Guy's and St. Thomas' NHS Foundation Trust

Health Service Journal Patient Safety Award Winners 2021

Dr Jayne Peters



Dr Luke Carter-Brzezinski

In 2021, the interventional radiology department at Manchester Royal Infirmary was named the winner of the Perioperative and Surgical Care Initiative of the Year at the Health Service Journal Patient Safety Awards. Here, they present their findings and recommendations for future studies.

Introduction

An observational study carried out at the Manchester Royal Infirmary suggested that a reduction in platelet thresholds to adhere to British Society of Haematology (BSH) guidance for tunnelled central line insertion does not increase bleeding complications in haematology patients. The study was a collaboration between the interventional radiology and haematology departments and was named winner of the Perioperative and Surgical Care Initiative of the Year at the Health Service Journal (HSJ) Patient Safety Awards.

Scope of the project

The BSH guideline, *Guidelines for the Use of Platelet Transfusions*,[1] recommends that a platelet threshold of >20 × 109/L should be considered for all patients undergoing ultrasound-guided insertion of a tunnelled venous central line by experienced staff. Below this value, transfusion of platelets is indicated.

Despite this recommendation, there remained significant national variability regarding the accepted platelet threshold for this procedure, with some local centres, including our own, still mandating a pre-procedural platelet count of >50 × 10^9/L. The concern remained that lowering the platelet threshold would increase the patient's bleeding risk, leading to procedural complications. The insertion of a tunnelled venous central line is a commonly performed procedure for oncology patients, including those with haematological malignancy, which allows for robust venous access prior to delivery of treatment. It is common for this patient cohort to have a lowered platelet count, either owing to bone marrow involvement of the disease or as a direct side effect of the treatment.

In conjunction with both departments, the platelet threshold was lowered from >50 × 10^9/L to >20 × 10^9/L in April 2018. We undertook a prospective, unblinded observational study and compared complication rates between the

Table 1. Patient platelet count distribution.

Parameter	n
Total lines inserted	73
Patients with platelet count <50 × 10^9/L	15
Patients with platelet count between 40 and 49 × 10^9/L	3
Patients with platelet count between 30 and 39 × 10^9/L	8
Patients with platelet count between 20 and 29 × 10^9/L	4

RETURN TO CONTENTS

Table 2. Observed patient complication rate.	
Parameter	n
Overall complication rate	2
Complication rate in patients with platelet count >50 × 109/L	1
Complication rate in patients with platelet count <50 × 109/L	1

patient group with a pre-procedural platelet count between 20 and 50 × 10^9/L, to those with a pre-procedural count of ›50 × 10^9/L. All patients with a deranged pre-procedural clotting screen (prothrombin time [PT] or activated partial thromboplastin time [APTT]) and those under the age of 16 were excluded. The data was collected between April 2018 and October 2019.

Outcomes and learning points

A total of 73 of the adult patients with a haematological malignancy underwent ultrasound-guided central tunnelled line insertion at Manchester Royal Infirmary between the specified timeframes (Table 1). A total of 15 patients (21%) had a pre-procedure platelet count of ‹50 × 10^9/L, of which:

- three patients had a platelet count of 40–49 × 10^9/L
- eight patients had a platelet count of 30–39 × 10^9/L
- four patients had a platelet count of 20–29 × 10^9/L.

The overall observed complication rate was 3% (two patients). Both patients developed a small haematoma at the insertion site requiring mechanical compression only; one patient had a pre-procedure platelet count of 40 × 10^9/L, the other patient had a pre-procedure platelet count of 357 × 10^9/L (Table 2).

Although a small-scale study, the experience from our centre is that adherence to the national platelet threshold guideline recommendation of ›20 × 10^9/L for ultrasound-guided tunnelled central line insertion is safe to implement with no observed increase in bleeding complications.

Furthermore, implementation of the national recommendation resulted in fewer delays to line insertion and therefore fewer delays for patients with a haematological malignancy receiving the required treatment. A reduction in the cancellation of line insertions was also observed for those patients with a pre-procedural platelet count of 20–50 × 10^9/L.

Importantly, by reducing the platelet threshold, 15 of the 73 patients (21%) avoided the unnecessary transfusion of platelets. The risks associated with platelet transfusions include transfusion reactions (in particular, those which are febrile and allergic in nature), transfusion transmitted infections and alloimmunisation. A reduced threshold also resulted in less pressure on hospital platelet stocks, allowing platelets to be more readily available for those patients who most require them.

The team was very proud to win this award. The judges said: "*[The project] demonstrated a brave approach to clinical practice with potential benefits across a number of departments. [The study] could have potential benefits at a national level and crossed boundaries between multiple specialities.*"

Conclusion

The outcomes of this project and the benefits for patient safety have been shared regionally and nationally to encourage colleagues to adopt a similar approach. By sharing our experience, we aim to improve the care of patients with a haematological malignancy and reduce the risks and delays associated with the unnecessary transfusion of platelets.

Although the study focused on a small number of patients, we have shown in our single centre experience that there was no increase in the observed bleeding complications in patients with a haematology malignancy when adopting the reduced platelet threshold of ›20 × 10^9/L for tunnelled line insertion. Studies with larger patient numbers are required to further validate these findings and to build evidence and user confidence within surgical and procedural specialties to implement a reduced platelet threshold as per national guidelines.

Reference available on our website.

Dr Jayne Peters
Consultant Haematologist

Dr Luke Carter-Brzezinski
Haematology Specialty Trainee
Manchester Universities NHS Foundation Trust

RETURN TO CONTENTS

Our workshop for the School Science Conference 2022: Totally Stem-azing Cells

Tim Dindjer

Thadcha Retneswaran

The College's Public Engagement team had excellent engagement with secondary school students who were invited to explore the fascinating world of stem cells including the ethical issues of 'saviour siblings' as stem cell donors for transplant.

The College participated in the highly popular 19th Annual School Science Conference with the overall theme of 'Science for Regeneration' held at the University of Westminster in April 2022 (science4u). The objectives of the conference were to:

- inspire students to study science
- demonstrate the importance of science in health and everyday life
- showcase some of the myriad careers open to those who study science.

The College's Public Engagement team organised stem cell workshops attended by around 350 secondary students supported by over 20 volunteers from a wide range of backgrounds, including consultants in haematology and microbiology, medical and scientist trainees and medical undergraduates.

The school students firstly participated in a hands-on activity to find out what stem cells are, understand the difference between unipotent, multipotent and totipotent stem cells, and learn about haemopoietic stem cell transplants.

Next, students were actively involved in discussion groups considering a case of a child with Fanconi's anaemia, an inherited bone marrow failure syndrome. They debated options for stem cell donors for transplant and the ethical considerations surrounding 'designer babies' and 'saviour siblings'. We were delighted to have a medical ethicist with a law background supporting the discussion.

The students were very well engaged with both activities and asked lots of questions and contributed to the lively discussion. It was truly gratifying to see so many hands up with students keen to participate and add their views to the ethical debate. Their enthusiasm for the workshop was reflected in the highly positive feedback that we received.

Teachers were awarded a certificate of activity attendance and were encouraged to continue exploring this topic in school within their classes using the list of useful links and resources provided by the College.

Tim Dindjer
Public Engagement Manager

Thadcha Retneswaran
Communications Officer

Feedback from the schools

Lammas School – *Many thanks again for the experience. Our students had a fantastic day! Most importantly, the students had a great educational time with comments including: "I really enjoyed the Totally Stem-amazing Cells session" and "it would be really nice to do more like that (especially the ethics/debating aspect)".*

St Marylebone School – *Our Year 10 students loved your workshop last summer and also the Science 4 U conference in Westminster last week. They gave some very positive feedback about their experiences! The day was very well received by students – so much so that we would love you to run our NHS day again in July!*

RETURN TO CONTENTS

The Royal College of Pathologists
Pathology: the science behind the cure

Opportunities to get involved with the College: five clinical director posts

These roles offer the opportunity to get involved in a number of exciting areas of work. Each appointment is for a term of three years and is remunerated for two programmed activities (PAs) per week. Applications are invited from Fellows of the College.

Clinical Director of Publishing and Engagement (Communications)

You will have editorial responsibility for the quarterly College *Bulletin* and oversee production of the College's best practice recommendations. Our public engagement work will rely on your clinical advice to help develop and trial new activities and resources.

To discuss the role informally, please contact Diane Gaston, Director of Communications: diane.gaston@rcpath.org or 020 7451 6743, or Professor Sarah Coupland, Vice President for Communications: sarah.coupland@rcpath.org

Clinical Director of Training and Assessment (Learning)

With a key role in postgraduate pathology training, you will oversee the curriculum approval and implementation processes and work of the College's specialty training committees. Supported by the training and assessment teams, this role requires collaboration with the Royal College of Physicians, which shares responsibility for many pathology specialties.

To discuss the role informally, please contact Joanne Brinklow, Director of Learning: joanne.brinklow@rcpath.org or 020 7451 6739, or Professor Angharad Davies, Vice President for Learning: angharad.davies@rcpath.org

Clinical Director of Examinations (Learning)

Responsible for the strategic development of the FRCPath, Diploma and Certificate examinations, you will work closely with the Examinations team, panel chairs and lead examiners and the wider Learning Directorate to ensure delivery of high-quality College examinations.

To discuss the role informally, please contact Joanne Brinklow, Director of Learning: joanne.brinklow@rcpath.org or 020 7451 6739, or Professor Angharad Davies, Vice President for Learning: angharad.davies@rcpath.org

Clinical Director of Digital Pathology Education (Learning)

You will be responsible for leadership and programme management for the development of the Pathology Portal including content creation, content mapping and content curation. This role will work in conjunction with all specialties across the College to continue development of the digital learning platform.

To discuss the role informally, please contact Sandra Dewar-Creighton, Assessment Manager: sandra.dewar-creighton@rcpath.org or 020 7451 6765, or Dr Esther Youd, Interim Project Lead for Pathology Portal: esther.youd@glasgow.ac.uk

Clinical Director of Quality and Safety

With a key role in supporting pathology practice and patient safety, you will help shape the materials, services and activities that the College provides to members, ensuring an innovative, forward-looking approach that delivers high-quality outputs.

You will work with our Professionalism Directorate and the members who volunteer their time to support us. You will bring a good understanding of the range of pathology specialties and the ability to consider the priority and impact of issues and decisions.

To discuss the role informally, please contact Katherine Timms, Director of Professionalism: Katherine.timms@rcpath.org

How to apply

Please submit an abridged CV and complete an application form. This must include a supporting statement of no more than 800 words, stating how your skills and experience are relevant for this post, how you meet the person specification and how you would approach the post.

Applications must reach Richard Sams, Business Administration Officer, by 9.00am on Tuesday 30 August (either by post to: Richard Sams, Business Administration Officer, The Royal College of Pathologists, 6 Alie Street, London E1 8QT or by email to richard.sams@rcpath.org).

Interviews

Interviews will be held at the Royal College of Pathologists, or by Teams meeting, during September.

PROFESSOR MONA EL-BAHRAWY

Professor Mona El-Bahrawy is a Professor of Practice and Consultant Histopathologist at the Section of Pathology at Imperial College London, UK, and President of the Egyptian Committee for Pathology Training. In this profile, she covers her career highlights so far, as well as tips for maintaining a good work–life balance.

Education, specialty and career pathway

I was born in Alexandria, Egypt, and studied at Al-Manar English Girls School. In my penultimate year at secondary school, I decided to study for the General Certificate of Education awarded by Cambridge International Examinations, alongside my Egyptian degree. I joined Alexandria Medical School in 1983 and I graduated in 1989. In 1991, I was appointed as a demonstrator in the Department of Pathology at Alexandria Medical School, where I started my training in pathology and began my academic career by teaching pathology to undergraduate medical students. In 1996, I successfully completed my MSc and achieved a promotion to assistant lecturer.

At the end of 1997, I was awarded a scholarship from the Egyptian Ministry of Higher Education to study for a PhD at Imperial College London, UK. By 2003, I had earned my PhD and concluded my training in histopathology in the London Deanery, where I rotated between Hammersmith Hospital, Charing Cross Hospital and the Royal Marsden Hospital and completed my MRCPath examinations.

In 2005, I was appointed as a consultant histopathologist and honorary clinical senior lecturer at Imperial College London. I have since developed my specialisation as a gynaecological pathologist with a special interest in gynaecological tumour pathology. I became the lead gynaecological pathologist for the gynaecological oncology multidisciplinary team of the Hammersmith Hospital and Queen Charlotte and Chelsea Hospital, which houses the West London Gynaecological Cancer Centre. Over the years, my academic work in teaching, training, student supervision and running my research group at Imperial College London has continued and I have progressed through the academic line up to my appointment as Professor of Practice in Histopathology in 2019.

Key achievements

As many will know, having a career that is a hybrid of academia and clinical service work is packed with challenges and I am proud that I have been able to coordinate academic and service work in my professional practice at the different stages of my career. This has involved caring for patients, teaching and supervising over 40 research degree students to successful completion of their studies, producing well over 100 publications, including scientific journal papers and book chapters, and training junior doctors.

Setting up the Egyptian Committee for Pathology Training

While living and working in the UK for many years, I am particularly pleased to have maintained

RETURN TO CONTENTS

my connection with my beloved country of origin, Egypt, and my home institution, the University of Alexandria. When the right time came, I started building a more structured set-up for this project, in my field of practice. Working with my colleagues and seniors in Egypt, we set up the Egyptian Committee for Pathology Training (ECPT). In 2014, under the patronage of the Supreme Council of Universities (SCU) of Egypt and in affiliation with the Egyptian Society of Pathology, the ECPT was established to support and enhance capacity in training, assessment and educational supervision in pathology.

> One day I came across a pathology book that stated that 'medical knowledge is like a tree, of which the roots are basic sciences, the stem is pathology and the foliage clinical practice'. I knew then that pathology was what I wanted to do.

In 2015, a memorandum of understanding was signed in Cairo between the RCPath, the ECPT and the SCU (renewed again in 2021) and another between the RCPath and the Egyptian Military Medical Services. The ECPT has since been working in partnership with the College and many distinguished Egyptian institutions to develop training programmes, qualifications, standards and best practice in pathology and laboratory medicine specialties.

Establishing events and exams internationally

Together, we developed the first ever International Pathology Summer School, which was held at the Armed Forces College of Medicine in Cairo and attended by undergraduate students from military and civil medical schools in Egypt and other countries in the Middle East and North Africa region.

We organised several joint educational and training events for trainees as well as trainers, with tutors from the UK and Egypt. The importance of these joint events goes beyond the value of shared knowledge, as we come to understand a diversity of approaches, attitudes, cultures and communications. We collaborated to set up the Cairo examination centre for Part 1 FRCPath examinations in all specialties and Part 2 examinations in histopathology. Our educational events and the exam centres in Egypt are attended by pathologists from Egypt, the Middle East, Africa and the Far East.

In 2018, International Pathology Day (IPD) was celebrated in Egypt for the first time, with events held at Shefa Al-Orman Charity Cancer Hospital in Luxor. In 2021, IPD expanded with celebrations also being held in Helwan Medical School, Modern University for Technology and Information Medical School, with several additional universities also developing plans. Working with the RCPath as Country Advisor for Egypt for the past six years and now as the President of the Egyptian Committee for Pathology Training, a lot has already been achieved and I look forward to our continuing success.

Challenges

Change has been a constant since the beginning of time, but nowadays the pace of change is phenomenal, and this represents as much of an opportunity as a challenge. The biggest challenge is maintaining a trained workforce that can adapt readily to rapid changes in practice and new technologies. This also needs appropriate resources and infrastructure to support continued professional development.

Finding a sense of identity and belonging

Centralisation of services in bigger laboratories has its merits, but also its challenges, especially when merging established institutions. One challenge that should not be overlooked is the conglomeration of different cultures into one space with one culture. Dealing with a change of identity and the need to find a sense of belonging are big challenges, especially to the seniors who are the most experienced and responsible for teams and the delivery of services at the new establishments.

Coordination is key

The integration of molecular testing into the practice of different specialties and the coordination between the different clinical teams, laboratories and the regional genomic laboratory hubs across the UK are new experiences. The necessary resources, most important of which is skilled workforce at both ends, and a clear agreeable workflow plan are most essential for running this service to the standards and timeliness required for patient service.

Inspiring trainees

Even before I joined medical school, I never saw myself on the wards, but more in a research laboratory, with clinical practice being my inspiration and basic sciences my foundation in that quest. One day I came across a pathology book that stated that 'medical knowledge is like a tree, of which the roots are basic sciences, the stem is pathology and the foliage clinical practice'. I knew then that pathology was what I wanted to do.

I was a third-year medical student sitting in the lecture theatre at Alexandria University when Professor Rawya Galal, Professor of Pathology, walked in to give a lecture. A lady with style and knowledge, in command of her subject, and of the room. Ever since that day, she has continued to be a role model and an inspiration to me; she developed my interest in pathology.

RETURN TO CONTENTS

As I was at the point of deciding my career specialty, I was also starting a family and I wanted to ensure that I could maintain a work–life balance. So, it seemed sensible to choose a specialty where I could plan my work with some flexibility and manageable working hours. Therefore, laboratory medicine, in particular histopathology, seemed right.

Maintaining a work–life balance

In principle, it is important to view every aspect of one's personal and professional life as a part of life and not one's whole life, with each deserving the due time and attention. With this mindset, you set your priorities at every stage in life. On a daily basis you know that at times one aspect may require more focus than the other but ensure that you even things out as you go.

You need to have good time management, making sure you do not bite off more than you can chew. You've got to be assertive with yourself and with others. Always make sure you include some fun and enjoyment as an integral part in whatever you do – for example, the decor in your office.

Diversity matters

I grew up in Alexandria, in a listed building that is part of an old church in the city centre. My neighbours were of different faiths and different nationalities. My school was right in front of my home. Founded in 1925, it was originally a Scottish school. It changed to Egyptian administration just before I joined, but even then, it still had the spirit and some of the staff (like Miss Helen, my first English teacher at primary school) from the former Scottish administration. The Alexandria Medical School was in the street just behind my home. So, despite spending the first 30 years of my life moving day to day within a radius of probably less than one mile, looking back I realise I was raised in a very cosmopolitan environment.

I travelled on short trips with my parents and went on student exchange programmes and I always found it easy to navigate and fit in. When I came to live in London, I felt equally at home. Exposure to diversity and having genuine respect and appreciation of different cultures makes one a global citizen, which is a great thing to be, especially in this day and age when it no longer takes 80 days to go around the world!

Baba Inusa

Sickle cell disease – overview of new therapies and RCPath partnership with the African Research and Innovation Initiative for Sickle Cell Education

This article summarises the exciting recent advances made in therapies for sickle cell disease (SCD). The global impact of SCD remains significant, especially in sub-Saharan Africa, and an international collaboration including the College has brought together researchers and clinicians to help improve patient outcomes.

Sickle cell disease (SCD) is a disorder of public health importance with estimated annual births of over 400,000 globally, about 75% of which occur in sub-Saharan Africa.[1,2]

In the UK, over 14,000 people live with the disorder. With annual births of about 250–300, equivalent to one in 2,000 live births,[3,4] and recent migration, its prevalence continues to increase in continental Europe.[5,6]

Pathophysiology

SCD is a group of autosomal recessive inherited disorders of haemoglobin in which β globin is mutated, leading to haemoglobin S (HbS) polymerisation when deoxygenated.[7] In the UK, homozygous inheritance of HbS, referred to as sickle cell anaemia, accounts for over 70% of cases, while the double heterozygous state where HbS is co-inherited with another abnormal β globin unit such as C (HbSC), which is predominantly west African in origin and accounts for about 20% of cases. The remaining 10% of patients with SCD have inherited both the mutated HbS β globin and the β thalassaemia trait (HbS/β+/o).[8,9]

HbS polymerises and forms linear elongated fibres that distort red blood cells (RBCs), leading to a chronic haemolytic anaemia and acute episodes of pain due to vaso-occlusive obstruction of blood flow and tissue ischaemia. The ensuing ischaemia/reperfusion injury leads to the generation of reactive oxygen species and endothelial cell activation with increased adhesion molecule expression, and

RETURN TO CONTENTS

Natasha Archer

Wale Atoyebi

Lucia Ruggieri

Duccio Bonifazi

RETURN TO CONTENTS

blood cell activation leading to a chronic inflammatory state in SCD. These mechanisms contribute to the development of pain and chronic organ damage, including sickle nephropathy, pulmonary hypertension, avascular necrosis of bone, chronic lung disease and ultimately a shortened life expectancy.[10,11]

Newborn screening

Successful management of SCD is underlined by early diagnosis through the implementation of newborn screening (NBS), followed by the introduction of appropriate interventions including penicillin V, immunisation programmes and parental education.[12] Universal NBS for SCD in England was introduced between 2003 and 2006. Screening is now offered UK-wide for all newborns as one of five conditions tested for on the newborn bloodspot.[13] In England, the newborn bloodspot from all infants is taken at five to eight days of age. The sample is analysed at designated laboratories and infants that test positive are then referred to the treatment centres after the community-based nurse specialist visits the family.[14]

The community-based service offers education and counselling prior to the affected infant's attendance at the treatment centre. Here, penicillin V treatment is introduced and comprehensive education about treatments, including hydroxyurea and other novel disease-modifying therapies, is discussed over a series of consultations.

Current treatment

The mainstay of therapy for SCD over the years has been hydroxycarbamide (hydroxyurea).[15] Hydroxyurea induces beneficial myelosuppression and γ globin (and thereby fetal haemoglobin) stimulation to reduce the frequency of SCD complications. Hydroxyurea was first licensed by the US Food and Drug Administration (FDA) in 1998 for SCD patients over 18 years who have had at least three painful crises in the past year. While it was only approved for paediatric patients aged two and older in 2017, it has been the main disease-modifying therapy used in children and adults since the Multicentre Study of Hydroxyurea (MSH) by Charache *et al.* in 1995.[16,17]

New therapies

Since 2017, three other disease-modifying therapies have been approved. L-glutamine, an essential amino acid whose mechanism is not fully understood, demonstrated a modest reduction in acute SCD complications. Based on this evidence, the FDA-approved L-glutamine oral powder (Endari, Emmaus Medical, Inc.) to reduce the acute complications of SCD in adult and pediatric patients five years and older.[18,19]

Crizanlizumab is an IV monoclonal antibody against the adhesion molecule P-selectin. P-selectin, expressed on the surface of endothelial cells, mediates abnormal adhesion of sickle RBCs to the endothelium, a process implicated in the painful vaso-occlusion in SCD. A randomised trial demonstrated a significantly decreased rate of vaso-occlusive crises (VOC), and prolonged time to first and second crises on crizanlizumab, while a retrospective study showed that those treated with crizanlizumab had sustained comparable VOC rates for up to 52 weeks after therapy.[20] Secondary to a reduction in the frequency of VOCs in both adults and children, crizanlizumab was approved by the FDA for patients 16 years old and older.

Voxelotor, an orally administered, small molecule that binds to the alpha chain of haemoglobin, inhibits HbS polymerisation by increasing HbS affinity for oxygen. While a randomised trial demonstrated a significantly higher percentage of participants with a Hb response (>1 g/dl from baseline), fewer instances of worsening anaemia and significant reduction in baseline markers of haemolysis with the drug, it has not demonstrated effectiveness in reducing pain or organ damage. It is currently FDA-approved for all patients with SCD age four years and above.[21]

Transfusion

Blood transfusion remains an important mainstay in the supportive management of SCD. There are significant ongoing challenges around red cell alloimmunisation and adequate provision of matched blood. The wider application of red cell genotyping techniques are being actively explored (see the article *Matching blood with computer intelligence: the future of red cell transfusion in the NHS* by Astle et al. in the October 2021 *Bulletin*).

Curative therapies

While disease-modifying therapies, mainly hydroxyurea, have drastically influenced the quality of life of many patients with SCD, curative options beyond hematopoietic stem cell transplant are currently being explored for this genetic condition. Hematopoietic stem cell transplant using allogeneic hematopoietic stem cells (either matched, related sibling donor or matched, unrelated donor) is the only FDA-approved cure for SCD.

Progress in curative therapies has ranged from improved methods of selection for allogenic sibling matched transplants (Figure 1)[22] to haplomatched transplant protocols. In addition, given most patients do not have a matched, related sibling donor and the unacceptably high risk of graft versus host disease (GVHD), gene therapy, including gene addition, editing or correction, is also currently being investigated as a potential curative option.[23,25] While it eliminates the risk of GVHD and the need for a donor, data on long-term efficiency and safety is still lacking.

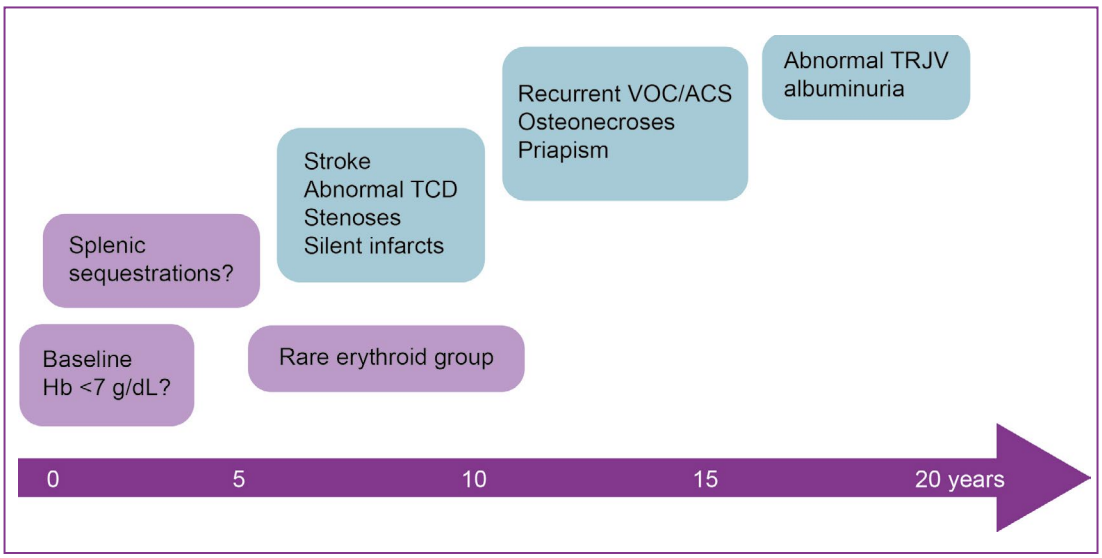


Figure 1. When to recommend stem cell transplant in sickle cell disease.[22]
ACS: Acute chest syndrome; Hb: Haemoglobin; TCD: Transcranial Doppler; TRJV: Tricuspid regurgitant jet velocity; VOC: Vaso-occlusive crises.

Global perspectives

As increasing progress is made towards reducing childhood mortality under five from infectious causes, non-communicable diseases (NCD) have risen to the forefront of the global health agenda. SCD is recognised as a significant cause of NCD-related childhood mortality and has been identified as an area requiring specific focus to meet the sustainable development goals.[1,6] Despite this, the global burden of SCD remains poorly characterised. Several initiatives have been developed to address the disparity in care for patients with SCD, with which the College has been closely involved. The global perspective of SCD highlights the urgent need for developing capacity in laboratory diagnostics and a sustainable NBS programme.[24] To this end, there are ongoing initiatives striving to achieve the correct approach in sub-Saharan Africa including the Consortium on NBS in Africa and ARISE.

The ARISE project

To harness these efforts, together with the College, we successfully applied for the Horizon 2020 Marie-Skłodowska Curie RISE grant to work in African countries, starting in Nigeria and Kenya and now expanding to Zambia and Angola. The project is titled ARISE – African Research and Innovation Initiative for Sickle Cell Education: Improving Research Capacity for Service Improvement (grant agreement no. 824021).

Key objectives

The overarching objective for the ARISE consortium is to establish an inter-agency and multidisciplinary staff exchange programme between researchers, technical and administrative staff within EU institutions as well as reaching out to non-EU countries in Africa, Lebanon and the US to foster sharing of best practice in NBS and diagnosis and treatment of SCD, leading to improvement in overall disease outcome. The consortium uses implementation science strategies to foster partnerships and establish patient databases, registries and a sustainable service for people living with SCD.

The project will attain four specific objectives (Figure 2):

- the evaluation of SCD prevalence in target countries
- the set up of laboratory diagnosis and quality assurance systems
- the feasibility assessment of establishing newborn and early infant screening for SCD
- the development of best practices in clinical management for acute and chronic complications in SCD, stroke, infections, severe anaemia as well as transition from paediatric to adult care, health promotion strategies and nutrition.

ARISE programmes

Work Package 3, led by the College, is aimed at improving the quality and capacity of laboratory diagnostic testing services for population screening in SCD with both a comprehensive education programme and the set up of a quality assurance system. A combined gap analysis and baseline needs assessment to implement a laboratory improvement plan have been built based on an electronic survey gathering the needs of laboratories in Nigeria.

In September 2019, a train-the-trainer workshop was held in Abuja to enhance the knowledge of professionals involved in SCD management, with a focus on laboratory skills.

The UK NEQAS external quality assurance for NBS programme has been launched in Kaduna state, Nigeria. Consequently, laboratory protocols for population screening for SCD/thalassemia and national prevention policies are in development. The ability to engage local and national

RETURN TO CONTENTS

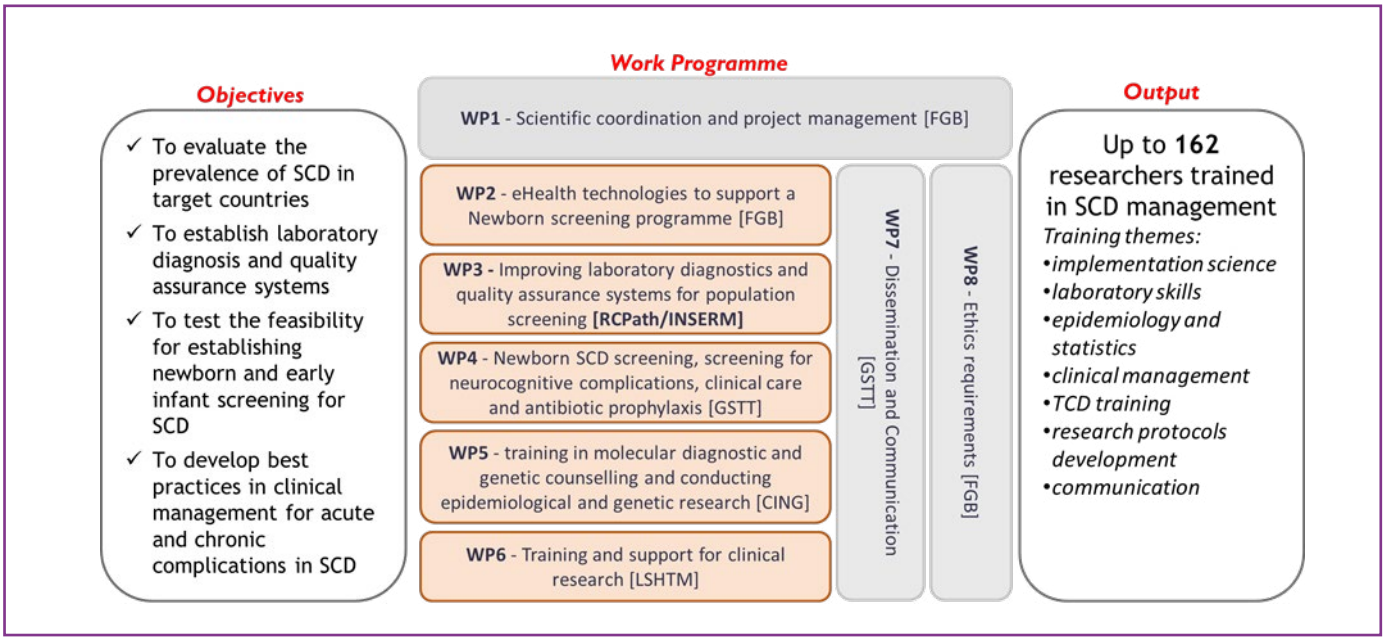


Figure 2. ARISE work programmes. To achieve the ARISE objectives, eight work packages were designed. The College leads work package 3 – Improving laboratory diagnosis and quality assurance systems for population screening. SCD: Sickle cell disease.

stakeholders, policymakers and healthcare providers is key.

Virtual training opportunities

With the spreading of the COVID-19 pandemic, the ARISE consortium employed several contingency measures to mitigate its impact. Individual training programmes were organised and teleworking was implemented. The Virtual Teaching Programme, comprising lectures and webinars, was implemented to provide preliminary background knowledge before visits.

The ARISE Virtual Teaching Programme, coordinated under Work Package 4, has been able to deliver 32 lectures spanning over eight different themes and capturing the interest of over 1,700 attendees. The programme has granted more than 1,100 CPD credits. ARISE also organised and hosted five webinars with more than 500 attendees.

All the project information, lecture recordings and more are available on the project website, which also includes an electronic library to facilitate sharing of knowledge.

The legacy of this programme

The partnership draws on a diverse team from different geographic settings with the potential to have access to a large volume of data and a high patient burden. It also brings together experts in geography and epidemiology to strengthen population studies, and those with a clinical and genetic background to foster an excellent basis of research and collaboration. This has the potential to become a template for future international collaboration to enhance health services and research in Africa. We therefore propose to establish a consortium to strengthen research capacity through innovative staff exchanges using work packages to accomplish the key objectives in SCD.

References available on our website.

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RETURN TO CONTENTS

Consultant clinical scientist programme

Lisa Ayers

Professor Berne Ferry

Berne Ferry and Lisa Ayers from the National School of Healthcare Science report on the successes of the Higher Specialist Scientific Training programme with haematologists and microbiologists from a medical and scientific background reflecting on the benefits of consultant scientist roles.

The Higher Specialist Scientific Training (HSST) programme is a five-year integrated doctoral level programme leading to the qualifications and skills necessary to work at consultant level in the NHS. The training programme is managed and delivered by the National School of Healthcare Science (NSHCS) and funded by Health Education England (HEE). HSSTs in pathology must obtain Fellowship of the RCPath through examination in their specialty, in addition to achieving a doctoral level qualification, a PgDip in Leadership and Management and meeting the HSS Standards of Proficiency through their professional development.

Developing careers as consultants

The HSST programme has been running for seven years and the first few cohorts are beginning to complete the programme. More than 40 individuals have now completed the programme and have moved into consultant scientist roles. In addition, many more have gained promotions into consultant and clinical lead roles during the programme. Alongside HSST, the consultant scientist workforce has grown with individuals achieving HSST equivalence through the Academy for Healthcare Science.

In 2021, we welcomed biomedical scientists to join the programme without the requirement to obtain equivalence as a clinical scientist. This positive change reflects the seniority and experience of biomedical scientists working at the highest levels within their specialty and increases the eligibility of healthcare scientists to receive funding and support.

COVID-19 impact

The impact of the pandemic over the last two years has brought about several challenges for our HSSTs. They are often part of their departments' senior management teams and many have had to interrupt their training to contribute to pandemic response. However, this has also led to opportunities to contribute both locally and nationally in ways that have enhanced their experience and professional development.

Importance for workforce

The workforce requirement for consultant scientists is growing rapidly as their role is increasingly recognised as essential across the specialities. To this end, the expressions of interest in supporting HSST positions has more than doubled in the last two years. The NSHCS and HEE are working hard to support and fund this increase in numbers, both through the universities and workplaces.

Below we have invited several consultant scientists and their medical consultant colleagues to discuss their positions, including how the two roles complement each other in their specialty.

Lisa Ayers
HSST Training Programme Director

Professor Berne Ferry
Head of the National School of Healthcare Science

RETURN TO CONTENTS

Deep understanding and invaluable skills

"Consultant clinical scientists have long provided clinical support in pathology. Clinical scientists carrying out clinical-facing consultant roles in microbiology and virology remain in the minority compared to our medical colleagues. However, an increase in formalised training posts facilitated by the NSHCS means that numbers have increased and look likely to continue to do so.

In an age of service consolidation and collaboration, consultant clinical scientists have a wide suite of skills and expertise that complement those of their medical colleagues within a wider infection team. Clinical scientists have a deep understanding of laboratory methodology, including the interpretation and limitations of diagnostic assays. They also have a research grounding that can prove invaluable.

Departments that train clinical scientists alongside their medical trainees talk of a mutually beneficial or 'symbiotic' training experience. We have much to learn and gain from each other. I know that I gained much from working and training alongside specialist trainees, and they have said the same."

Dr Rob Shorten MSc PhD FRCPath
Consultant Clinical Scientist
Department of Microbiology, Lancashire Teaching Hospitals NHS Foundation Trust

An essential, multi-professional approach

"Workforce shortages in clinical haematology have been long recognised but are difficult to solve. The haematology consultant clinical scientist is well placed to perform haematology diagnostic clinics and take leadership roles such as lead consultant for blood transfusion, haemostasis/thrombosis and laboratory director. This not only supports new patient referrals requiring diagnosis and the management of waiting times, but also releases time from medical consultant job plans.

The benefit of this approach requires investment and planning. The target (consultant) role of the clinical scientist in higher specialist training must be determined from the outset, with training supported by medical consultant colleagues. I believe this multi-professional approach is essential for a secure and sustainable future for clinical haematology services. We are now at a critical moment where change and modernisation are urgently required."

Dr Sharran Grey OBE DClinSci FRCPath FBBTS FAHCS
Haematology Consultant Clinical Scientist
Lancashire Haematology Centre, UK

RETURN TO CONTENTS

Expertise, insight and understanding

"The world of microbiology and infection is an increasingly complex one, with the demand for specialist diagnostics interpretation and clinical consultations growing year on year. Despite this, the specialty of infection medicine is relatively small and thinly stretched. It is also increasingly clinical and, with the introduction of combined infection training in 2016, provides somewhat less time for laboratory experience than in the previous pure medical microbiology and virology training programmes. This is where consultant clinical scientists have fast become an invaluable part of the team.

While there is significant overlap in skills and knowledge, consultant clinical scientists also bring additional expertise, insight and understanding of laboratory methodologies, which, combined with their clinical knowledge and good working relationship with medical colleagues, can help shape and develop infection services. We learn from each other, help each other and share the same goals. We are complementary colleagues."

Dr Louise Sweeney, BSc MBChB FRCPath
Consultant Medical Microbiologist
Department of Microbiology, Manchester Medical Microbiology Partnership, Manchester University NHS Foundation Trust

A modern and more streamlined haematology service

"Haematology has seen an increase in the number of referrals over the past years. The vast majority of these will not have a primary haematological diagnosis that requires ongoing haematological care. The haematology consultant clinical scientist can assess these and discharge the majority back to the GP with advice, but also diagnose and work-up primary haematological conditions and for a medical consultant colleague to take over the next stage in the patient's care. This allows the physicians to focus on true haematological problems, which is rewarding and allows more time to be spent with those with a confirmed haematological condition.

Haematology has also seen an explosion of novel agents in the last five years that has dramatically improved the outlook for haematological malignancies. However, the delivery of these is time-consuming and the haematology consultant clinical scientist allows more time to be spent in such specialised clinics.

The haematology consultant clinical scientist is more experienced to lead in laboratory roles than physicians, having spent the majority of their working lives in labs. This again frees up valuable physician time. The consultant clinical scientist has a valuable role in specialty training.

The appointment of a consultant clinical scientist has made our placement a more rewarding educational experience for trainees, especially for College exam preparation. Together, traditional consultant haematologists can work with haematology consultant clinical scientists to provide a modern and more streamlined haematology service in the face of continued and growing consultant workforce shortages."

Dr Paul Cahalin MA MRCP FRCPath
Consultant Haematologist
Lancashire Haematology Centre, UK

RETURN TO CONTENTS

Community roll-out of the Medical Examiner Service: electronic referral service

Tanaya Sarkhel

Ruth Richardson

Jason Lane

Since April 2022, it is a statutory requirement for all deaths in England and Wales to be scrutinised by the Medical Examiner Service. Ashford & St Peter's Hospitals NHS Foundation Trust describe their experience on implementing cost-neutral NHS referral pathways.

The ask

On 8 June 2021, NHS England wrote to general practices setting out the requirement to implement the National Medical Examiner System for scrutiny of non-coronial deaths across all health settings, anticipating a start date of April 2022.[1]

Although the National Medical Examiner's Office (MEO) is well established, there was no centralised process to accompany this undertaking. This gave us scope to be innovative with existing NHS platforms to meet local expectations and challenges.

The Ashford & St Peter's Hospitals NHS Foundation Trust's (ASPHFT) MEO was set up in March 2020. Deaths in our Acute Trust are reported to the ASPHFT MEO via a daily report and an overview of the week. The daily report prompts the bereavement team to order the notes from the ward, reconcile property and clarify next of kin contact details before passing the notes to the MEO for scrutiny. Members of the attending team complete the medical certificate of cause of death (MCCD), with a medical examiner (ME) available for discussion. Once an MCCD is completed and a cause of death is available, the bereavement team electronically communicates the details of the death to the GP practice (DocMan). If a GP practice has not signed up for this process, a paper copy can be either scanned or posted to notify them of the death. The practice team then deducts the patient from the NHS Summary Care Record ('the Spine').

The exception to this process comes from deaths occurring in the emergency department (ED). ED patients are not admitted so cannot be discharged in the same way as inpatients. In this situation, the ED team calls through to the bereavement office to notify them of the death.

The active file of paper notes of the last episode is received into the MEO for scrutiny with the electronic scanned record of past episodes (Evolve), imaging records (PACS) and cross-referenced with the NHS Summary Care Record. Scrutiny, conversations with reporting doctors, Coroners' offices and families are recorded via a modified patient experience module of the Datix platform.

With community roll-out, we looked to see how we could reproduce this process, how we could be alerted to a death in the community, and how we could access sufficient primary and community care records to perform a meaningful scrutiny.

The obstacles

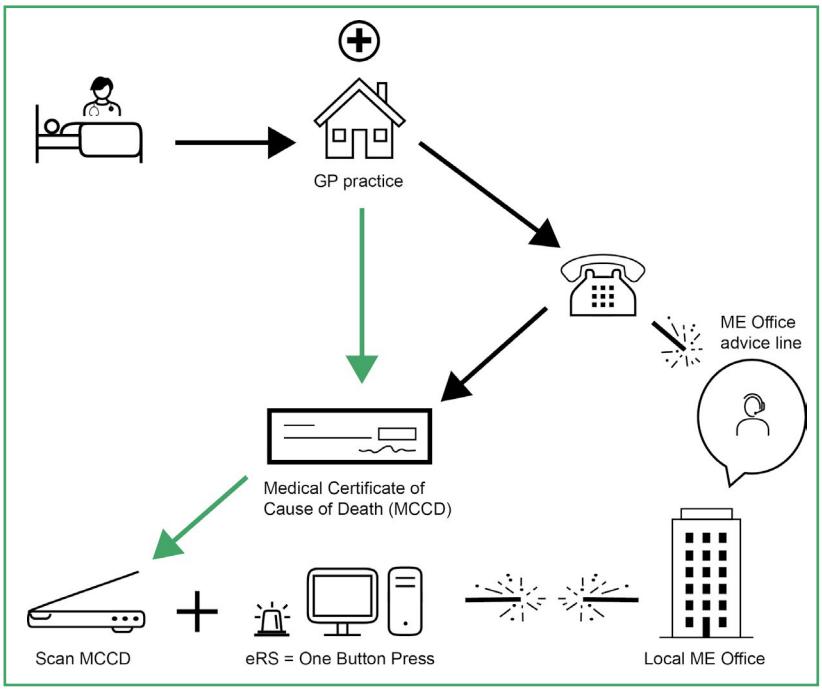
MEOs were being rolled out with no central funding available for business development. In this respect, the NHS pandemic response helped us, as the limited scope for elective orthopaedic surgery allowed us to second senior business management support for 12 months, without which this project could not have been developed.

Most primary care practices in our catchment use EMIS, with approximately 10% using System One. Work done in pilot sites in Dorset and Sheffield showed us that obtaining viewing permissions for these systems could be as onerous as negotiating individual data-sharing agreements with every single practice which would be challenging across 104 practices in our catchment population.

The Trust had a licence for EMIS Viewer as it was used by our ED. However as soon as a patient had been 'deducted' from the Summary Care Record, we were no longer able to view their notes. We quickly learned that deductions could be made by a wide variety of team members so the timing of deductions was something we could not hope to reliably influence.

We had no route to directly communicate with GP practices. The pandemic response had moved GP contact to email and online messaging with a response turnaround time outside the 72-hour key performance indicator we had established to

RETURN TO CONTENTS



The electronic referral service process. ME: Medical examiner.

ensure families could register within the five days proscribed in law.[2]

Our Integrated Care Service (Surrey Heartlands ICS), in common with sister organisations, had begun development of a Shared Care Record (Surrey Care Record). Ultimately this will be a useful scrutiny resource, but at time of writing, two years into the project, one of the four Acute Trusts of the ICS has not yet signed up to release clinic letters and discharge summaries, and not all the 104 GP practices have signed up to allow their coded data to be viewed.[3]

A workaround: electronic referral service

The three authors and two ME officers all formerly worked in the Rowley Bristow Orthopaedic Unit of ASPHFT. The electronic referral service (eRS) is the standard method of referral for our primary care partners in the orthopaedic department (Surrey iMSK) where we receive approximately 450–500 eRS referrals per week.

GPs choose which subspecialty they want to refer into from the eRS Directory of Services (DOS) and after describing the presenting complaint, the rest of the referral including the GP summary document, is auto-populated by EMIS or System One and electronically sent into the department.

We wanted a system that alerted us to a death, delivered a data packet of the patient record sufficient for meaningful scrutiny and allowed us to communicate back immediately to the GPs. Just as importantly, we wanted a one-button press for our GP colleagues. We were acutely aware that the timing of community roll-out coincided with some of the greatest pressures ever placed upon primary care. The COVID vaccination project was ongoing, just as patients were returning to face-to-face appointments, while staff absence from the circulating virus variants continued to impact the healthcare workforce.

eRS is an auditable, trackable two-way information highway that currently exists for out-patient activity in all NHS Trusts in England and Wales. We did not have to develop a new system requiring financial investment.[4] Using this mechanism was the idea of author Jason Lane, who was familiar with its capabilities within elective orthopaedics services.

We clarified the key steps within the community referral process with two hospice partners: Princess Alice at Esher and Woking & Sam Beare, which was the lockdown project of author Ruth Richardson.

Together we developed our referral dataset, which contains the information required in the National Quarterly Reports and includes the primary contact details of the next of kin and the resting place of the body. With this referral comes a scanned copy of the MCCD and a scanned copy of the last episode notes. We asked the hospices to send the scanned MCCD so that, if the offered cause of death conformed to scrutiny and to the General Registry Office's guidelines, we could forward it straight to the registrars without delay.

We began the hospice roll-out on 2 February 2021 and held joint snagging meetings until we were all happy with the processes. From the very positive experiences this generated, we felt empowered to move from this paper-based trial to the electronic one-button press.

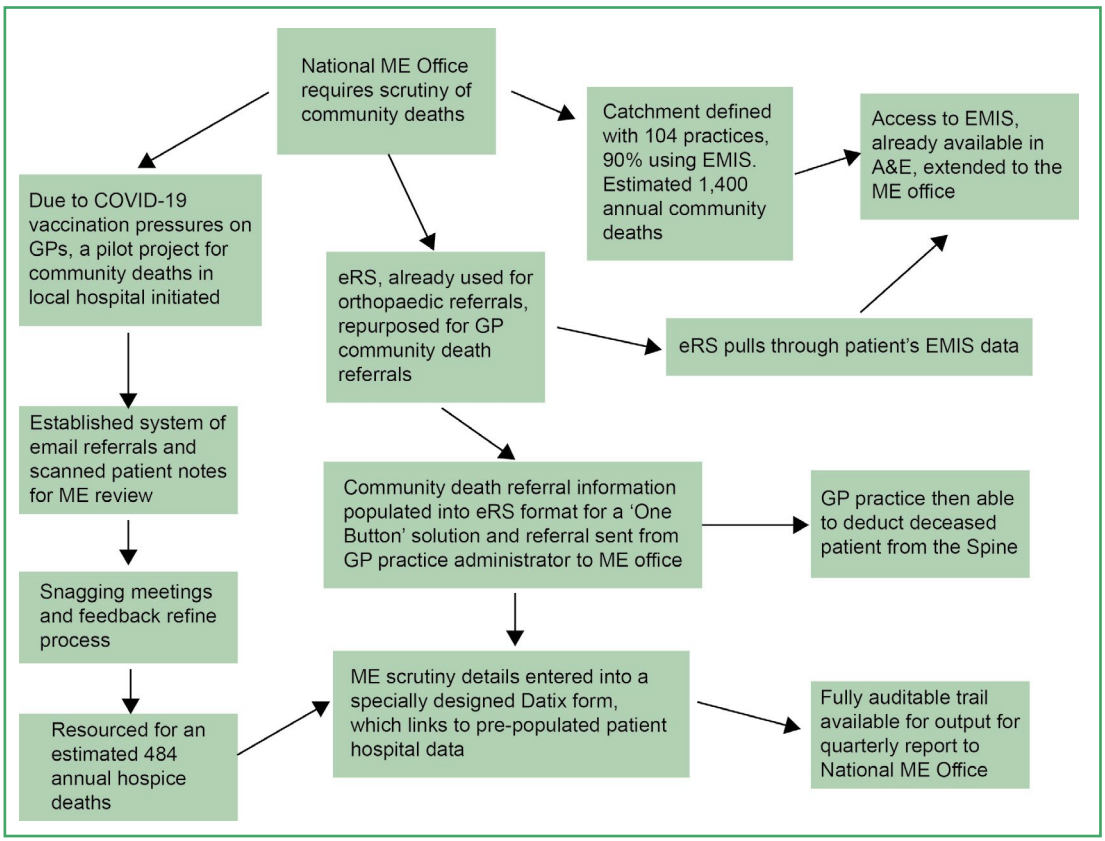
One-button press

eRS gives us the one-button press. When a GP has attended a death in the community, they are able to construct an MCCD or discuss options with the MEO first. The GP or an administrator then starts the referral process. Our ICS has four MEOs and through the DOS, the practice has the option to choose the most relevant Trust office. The referral is pre-populated by EMIS, which is programmed to attach the last six months of GP notes. The scanned MCCD is the final attachment, and the entire data packet is sent electronically to the MEO.

Once the eRS is sent, the patient record can be deducted from the Spine. If the deduction is made before the referral is sent, the process will fall foul of the failsafe mechanism that prevents appointments being sent out to deceased patients. There is no need to keep the record open any longer than necessary to alert the MEO to the death.

The referral system is monitored by the ME officers and requires smartcard access. If there is any missing information or if the need for a Coroner's referral becomes apparent, the MEs can reply back via the eRS process. This is also the mechanism to convey compliments and responses from families contacted by the MEs. The referrals are logged into the Datix database and allocated to MEs for scrutiny. Once scrutiny is complete, the next of

RETURN TO CONTENTS



Flowchart describing the electronic referal process. eRS: Electronic referral service; ME: Medical examiner.

kin are contacted and the MCCD is then forwarded to the registry office.

Results

We knew the end-to-end process worked as a paper-based system with the hospices and our first attempts with dummy patients worked well. In March 2022, we received our first real cases and have been delighted to see it is a one-button press for the practice. Six months' data seems sufficient and we have avoided the need for individual data-sharing agreements or direct EMIS access and licences for MEs. Communication via the eRS process permits rapid responses and there have been no delays to the prompt deduction of patients from the Spine.

How to set up eRS for your service

Each MEO will need to contact their Trust's service development manager to have their office placed as an option on the eRS DOS. We recommend styling in the format 'Medical Examiner's Office – Trust Name', particularly if your ICS hosts more than one Acute Trust. The MEs need smartcard access – this may require a modified keyboard or smartcard reader.

All data packets can be allocated and scrutinised electronically though some organisations may prefer printed incoming referrals. Our expectation is that the checks our workload as MEs will double with full community roll-out. We are not creating hard copies.

Link up with Trust managers in out-patient specialties that use the eRS process routinely, if the expertise does not currently sit within your MEO. It is relatively intuitive but if snags arise at either end their experience will be invaluable.

End-to-end snagging with a pilot practice is essential. We benefitted from hands-on support from our ICS primary care team locality interface manager and the support team from the ICS shared care record. We are indebted to the clinical lead for Surrey Heartlands ICS who helped us link with local medical committees and primary care networks, and the chief digital officer for Surrey Heartlands ICS who linked us with workstreams around the shared care record. We strongly recommend seeking out their equivalents in your ICS for their skills in putting the right people in the room.

Summary

We feel the eRS process with the automatic attachment of the GP summary and the last 6–12 months of GP notes is a workable, practical solution to allow community roll-out without additional resources. We have shown it allows two-way communication, creates no extra workload and does not require additional funding or negotiation of data-sharing agreements. It is trackable and auditable and can be tailored to provide feedback to practices from families, contributing practice-level data to support learning from deaths.

References available on our website.

Tanaya Sarkhel
Lead Medical Examiner & Consultant Orthopaedic Surgeon
ASPHFT

Ruth Richardson
ST7 T&O
Health Education England Kent, Surrey & Sussex

Jason Lane
General Manager Special Surgery and MSK Services
ASPHFT

RETURN TO CONTENTS

The impact of COVID-19 on antifungal stewardship in a UK tertiary teaching hospital: a review of prescribing practices and therapeutic drug monitoring of posaconazole

In January 2020, COVID-19 placed the NHS under enormous strain, with many services reduced to meet the unprecedented challenges of the pandemic. Prescribing practices and therapeutic drug monitoring of posaconazole were audited to assess the impact of the pandemic on antifungal stewardship services.

Background

Posaconazole is a triazole antifungal licensed for the prevention of invasive fungal infections (IFIs) in haemato-oncology patients and treatment of IFIs where first-line therapy has failed.[1]

Aims and objectives

This audit aimed to assess the impact of COVID-19 on our antifungal stewardship (AFS) service. This was accomplished by reviewing the Cambridge University Hospitals (CUH) inpatient population prescribed posaconazole following a previous audit performed in 2019 and comparing any changes. Areas of review included:

- the characteristics of patients prescribed posaconazole
- whether posaconazole is prescribed in accordance with local guidelines
- whether patients receive a loading dose at the initiation of therapy
- whether therapeutic drug monitoring (TDM) is performed and at the appropriate time
- whether posaconazole is stopped appropriately and in a timely manner
- whether there are any breakthrough infections in patients receiving prophylactic posaconazole.

Standards

1. 100% of indications for posaconazole prescription should be for conditions listed in the CUH guidelines.[2,3]
2. 100% of haemato-oncology patients receiving posaconazole as the first-line primary prophylaxis treatment should be in the high-risk categories specified in the guidelines.[2]
3. 100% of patients receiving posaconazole for treatment have tried and failed first- and second-line treatment with alternative triazoles.[1]
4. 100% of patients initiating posaconazole should receive the correct loading dose of this medication.[1]
5. 100% of patients initiating posaconazole should have TDM.[4–6]
6. 100% of patients initiating posaconazole should have TDM within three to eight days of commencing therapy.[4–6]
7. 100% of patients who undergo modification of posaconazole dose should have TDM repeated within three to eight days of the change in therapy.[4–6]
8. 100% of TDM result turnaround-times (TATs) should be less than five days.
9. 100% of posaconazole prescriptions for prophylaxis should be stopped appropriately when patients are no longer receiving immunosuppression or the neutropenia has resolved.[2]
10. 100% of patients who had either stopped posaconazole or changed to another antifungal agent had an appropriate indication.

Methods

Addenbrooke's Hospital, Cambridge, UK, is a specialist centre for haemato-oncology, transplantation (solid organ/stem cell), neurosciences and infectious diseases. Antifungal stewardship at the Trust is overseen by a team of two microbiology consultants and a part-time antifungal pharmacist, who provide clinical advice, conduct weekly ward rounds and attend the weekly adult haemato-oncology multidisciplinary team meetings.

RETURN TO CONTENTS

Table 1. Baseline characteristics of the study populations.		
	2019 cohort	2020 cohort
Total number of patients included in the audit	49	42
Median age (years)	56	61
Range (years)	7–78	4–84
Percentage of female patients	37% (18/49)	33% (14/42)
Percentage of male patients	63% (31/49)	66% (28/42)
Percentage of patients by specialty		
Adult		
Haemato-oncology	88% (43/49)	90% (38/42)*
Rheumatology	–	2% (1/42)*
Respiratory medicine	4% (2/49)	–
ENT	2% (1/49)	–
Paediatric		
Oncology	4% (2/49)	7% (3/42)
Respiratory	2% (1/49)	2% (1/42)
Percentage of patients on posaconazole		
Primary prophylaxis	94% (46/49)	90% (38/42)
Secondary prophylaxis	–	5% (2/42)
Treatment		
Possible	6% (3/49)	2% (1/42)
Probable	–	–
Proven	–	2% (1/42)

*One patient was under both haematology and rheumatology.
ENT: Ear, nose and throat.

Inpatients prescribed posaconazole over two three-month periods at the hospital were identified using the electronic computer system Epic (Epic Systems Corp., USA) and their records were reviewed for demographic, diagnostic and therapeutic data. Posaconazole levels were performed at the national Mycology Reference Laboratory, Bristol, using guide levels of 0.7–3.75 mg/l (prophylaxis) and 1–3.75 mg/l (treatment).[6] The first pre-dose level for each patient was used in analyses. Patients with only outpatient posaconazole prescriptions during the period were excluded from analyses.

Results

The overall number of patients receiving posaconazole has remained approximately steady, with 42 patients identified in 2020 compared with 49 in 2019 (Table 1). Furthermore, the demographic features of patients in the 2019 and 2020 cohorts were similar. In both study populations, the specialist team with the largest number of patients on posaconazole was adult haemato-oncology.

The majority of patients were prescribed posaconazole for primary prophylaxis against IFIs: 94% (2019) and 90% (2020). In 2020, two patients received posaconazole for secondary prophylaxis. In 2019, three patients received posaconazole as treatment for possible IFIs according to EORTC (European Organization for Research and Treatment of Cancer/Invasive Fungal Infections Cooperative Group) criteria:[7] two cases of possible ABPA/Aspergilloma, one possible fungal skull base osteomyelitis. In 2020, according to the EORTC criteria,[7] a possible infection with *Aspergillus fumigatus* in a paediatric cystic fibrosis patient and a proven infection of *Aspergillus flavus* in a paediatric aplastic anaemia patient were treated with posaconazole.

Table 2 summarises our findings against the audit standards. In both cohorts, most patients on posaconazole had a condition listed in the CUH guidelines[2–4] and in all the cases the indication was prophylaxis. We did not have guidelines in place for four patients (3, 2019; 1, 2020) on posaconazole for treatment. However, each case was reviewed

RETURN TO CONTENTS

Table 2. Comparison of audit standards in the 2019 and 2020 cohorts.		
Standard	2019 cohort % of patients (number of patients)	2020 cohort % of patients (number of patients)
1. 100% of indications for posaconazole prescriptions should be for conditions listed in the CUH guidelines	94% (46/49)	98% (41/42)
2. 100% of haematology/oncology patients receiving posaconazole as the first-line primary prophylaxis treatment should be in the high-risk categories specified in the adult haematology and paediatric haematology guidelines	100% (45/45)	95% (36/38)
3. 100% of patients receiving posaconazole for treatment have tried and failed first- and second-line treatment with alternative triazoles, i.e. itraconazole and/or voriconazole	100% (1/1)	50% (1/2)
4. 100% of patients initiating posaconazole should receive the correct loading dose of this medication	89% (41/46)	81% (34/42)
5. 100% of patients initiating posaconazole should have TDM when commencing therapy	100% (46/46)	79% (33/42)
6. 100% of patients initiating posaconazole should have TDM within three to eight days of commencing therapy	54% (25/46)	43% (18/42)
7. 100% of patients who undergo modification of posaconazole dose should have TDM repeated within three to eight days of the change in therapy	90% (9/10)	23% (3/13)
8. 100% of TDM result turn-around-times should be less than five days TATs from sample arriving in CUH lab > results phoned from ref lab TATs from sample arriving in CUH lab > final verification of results	 70% (32/46) 24% (11/46)	 97% (32/33) 36% (12/33)
9. 100% of posaconazole prescriptions for prophylaxis should be stopped appropriately when patients are no longer receiving immunosuppression, or the neutropenia has resolved	100% (23/23)	92% (24/26)
10. 100% of patients who had either stopped posaconazole or changed to another antifungal agent had an appropriate indication	N/A	88% (28/32)
CUH: Cambridge University Hospitals; TAT: Turn-around-time. TDM: Therapeutic drug monitoring.		

by the AFS team and the indications were deemed appropriate.

In 2019, all the haemato-oncology patients (100%) commenced on posaconazole as first-line primary prophylaxis was deemed in the high-risk category specified by local guidelines.[2] Two patients (out of 36) were not considered high-risk for posaconazole prophylaxis according to Trust guidance in 2020, with one subsequently stopping.

Most patients who were commenced on posaconazole were appropriately loaded with the medication with the results being comparable in both audits (89%, 2019; 81%, 2020). There was a noticeable difference in TDM of posaconazole between the two cohorts with compliance falling in 2020. Posaconazole TDM after commencing therapy fell from 100% (2019) to 79% (2020), with poor compliance of levels being sent within three to eight days as recommended by the UKHSA Mycology Reference Laboratory[6] in both years (54%, 2019; 43%, 2020). Notably, only 23% of patients who had a dose modification had TDM within three to eight days of the change in 2020 compared with 90% in 2019.

There was an increase in the TATs for verbally-reported results from the reference laboratory in Bristol, from 70% (2019) to 97% (2020). However, our data showed that the TATs for final verified reports to go onto our electronic computer system was not within the five-day standard with only 24% and 36% compliance, for 2019 and 2020, respectively. The median turnaround time for a verbal result was two days (IQR = 2) in 2019 and one day (IQR =1) in 2020, and to receive a final verified report was seven days (IQR = 6.75) in 2019 and nine days (IQR = 14) in 2020.

Furthermore, posaconazole prescriptions were generally stopped appropriately when patients were no longer receiving immunosuppression or their neutropenia had resolved during the audit period (100%, 2019; 92% 2020). The 2020 audit also reviewed the indications for stopping or switching antifungal agents. For ten patients with active prescriptions at the time of data collection or death, eight of them still had valid indications.

RETURN TO CONTENTS

Table 3. Summary of reasons for changing or stopping posaconazole.	
Reasons for changing or stopping posaconazole	2020 cohort % of patients (number of patients)
No longer categorised as high-risk	50% (16/32)
Drug interactions	6% (2/32)
Route inappropriate (requiring a different antifungal)	3% (1/32)
Palliation	6% (2/32)
Suspected or proven invasive fungal infection	19% (6/32)
Clinical improvement (for treatment doses)	6% (2/32)
Unknown	9% (3/32)

For the remaining 32 patients, Table 3 summarises the reasons that posaconazole was stopped or changed of which 88% were deemed appropriate indications. Importantly, in 2020, six patients (19%) developed suspected (five) or proven (one) breakthrough IFIs following the use of prophylactic posaconazole, compared to 2019 during which no breakthrough infections were seen.

Conclusions

Despite the pressures of COVID-19, there were good standards of care with only slight reductions in compliance, with the exception of TDM. This may have reflected the change from face-to-face to virtual meetings with haemato-oncology, as well as represented issues of staff shortages and changes in hospital priorities. Such data has highlighted the usefulness of technology to facilitate AFS, e.g. electronic prescribing order sets, which would provide us with quality assurance in a system that will be facing ongoing pressures as a result of the pandemic for years to come.

In the 2020 cohort, there was one proven and five suspected breakthrough IFIs in the patients on prophylaxis. As the majority were classified as possible infections, this may represent an overestimation but should warrant further investigation to ensure posaconazole can continue as a first-line agent for prophylaxis in our haemato-oncology patients.

Recommendations

1. Work with the EPIC Team at the Trust to create an electronic order set for posaconazole prescriptions that includes TDM with the posaconazole loading and maintenance prescription panel.
2. Educate clinicians through maintaining close liaison between microbiology and haemato-oncology teams.
3. Re-audit at the end of 2022.

References available on our website.

Dr Adam Andreani
Foundation-Year Doctor in Haematology

Dr Rachel Bousfield
Infection Specialist Registrar

Netta Tyler
Specialist Antifungal Pharmacist

Dr Christianne Micallef
Principal Pharmacist – Antimicrobials

Aleksandra Scibor-Stepien
Pharmacy Technician

Dr David Enoch
Antifungal Stewardship Lead and Consultant in Microbiology

Dr Vanessa Wong
Consultant in Microbiology and Infectious Diseases
Cambridge University Hospitals NHS Foundation Trust

RETURN TO CONTENTS

Appreciation: Angela Robinson, MRCS, LRCP, FRCPath (1942–2021)

Angela Robinson, who for 13 years was Medical Director of the National Blood Service (later NHS Blood and Transplant) died on 4 December 2021, aged 78, six weeks after a lung cancer diagnosis and while still preparing evidence for the Infected Blood Inquiry.

Elizabeth Angela Eleanor Robinson was born in 1942, educated at Dame Alice Harpur School, Bedford and qualified from St Mary's Medical School in 1967, having won the Max Bonn Prize in pathology. After house jobs, she moved to Leeds, where she trained in general pathology, paediatrics and haematology. In 1976, she was appointed consultant at the Yorkshire Regional Transfusion Service (YRBTS), in a joint role with the paediatric oncology service. She developed an interest in apheresis, establishing a regional therapeutic service and the first UK donor apheresis clinic in Bradford city centre. She was active in developing national donor and patient guidelines and advocated for self-sufficiency in plasma provision. Her interest in apheresis later extended to stem cell collection and she became Vice President of the World Apheresis Association. In 1988, she was appointed Chief Executive of the YRBTS, successfully managing the transition to a more business-like model. She was also an active member of the regional 'women in management' group.

Following creation of the National Blood Authority, Angela was appointed Medical Director in 1994. This started a decade of unprecedented development in the transfusion service in England, of which Angela was the pivot. With Dr Tim Wallington, she ensured there was a focus on improving clinical transfusion practice, with recruitment of a team of consultants and transfusion practitioners led by Professor Mike Murphy. This provided a platform for clinical studies and a Cochrane Collaboration, creation of the National Blood Transfusion Committee, the 'Better Blood Transfusion' Health Service Circulars, followed by the National Comparative Audit and Blood Stocks Management schemes.

Blood safety also took a quantum leap, with Angela pressing for, then leading the challenging hepatitis C lookback in 1995 with characteristic energy and good humour. With Professor John Cash, she initiated the formation of the Serious Hazards of Transfusion (SHOT) UK haemovigilance scheme in 1996, now globally recognised for its contribution to blood safety. She also pushed

for blood screening for human T-lymphotropic virus (HTLV), introduced in 2002. The biggest safety issue of her tenure, however, was variant Creutzfeldt-Jakob disease (vCJD). With its first description in 1996, Angela established links to the National CJD Research and Surveillance Unit and, with Pat Hewitt, established the Transfusion Medicine Epidemiology Review, which confirmed human transmission of vCJD by transfusion. Mitigating this risk required white cell filtration of the entire blood supply, importation of fresh frozen plasma for children and an even greater focus on appropriate blood use.

The European Commission recognised Angela's expertise and she became an important influence in shaping the European Union Directives for the Quality and Safety of Blood. She later chaired the Council of Europe Expert Committee on Blood Transfusion and was awarded the HR Nevanlinna medal by the Finnish Red Cross in 2001.

Angela understood that change needed direction, which could be achieved only through the effort of many colleagues. Her interpersonal skills were key to her success, bringing together government, the NHS Blood and Transplant (NHSBT) board and scientific and clinical expertise to achieve so much. She was fun to be with, unforgettable in a Viking helmet when opening a conference in York. She had a passion for horses and we became accustomed to seeing limbs in plaster. In retirement, she was a keen choral singer and flautist, and learnt the oboe from scratch. She is survived by her second

RETURN TO CONTENTS

husband Geoff Milnes, her children Alex, Amy and Isobel and eight grandchildren.

Dr Lorna M Williamson OBE
Former Medical and Research Director
NHS Blood and Transplant

With contributions from Pat Hewitt, Mike Murphy, Tim Wallington, Peter Flanagan and Geoff Milne.

Appreciation: Professor Peter M Biggs, CBE, FRCVS, FRS, DSc, DVM, FRCPath

Peter Biggs was a world-class pathologist.

The Avian Leukosis Complex had been known since the early 1900s to be a cause of infectious disease of poultry but almost all the scientific understanding of the complex was unknown. This was the proposed new area of research at the Houghton Poultry Research Station (HPRS) in St Ives, Cambridgeshire that, in 1959, attracted Peter to move from the University of Bristol where he had recently completed a PhD after graduating from the Royal Veterinary College in 1953.

Peter helped build a strong scientific team (a major collaborator was Jim Payne) and the group soon identified a novel cell-associated and tumour-inducing alphaherpesvirus as the causative agent of a lymphoproliferative condition, which Peter named Marek's Disease (MD) after the veterinary clinician and pathologist Dr József Marek who in 1907 provided the first description of the disease. Peter and colleagues were able to establish experimental transmission of MD, isolate the causative agent and produce the first ever vaccine (virus attenuated by serial passage in cell culture) against MD all within the space of nine years – an achievement that Peter was very proud of. In addition, Peter and Jim were able to show that, within the Avian Leukosis Complex, MD was distinct from disease caused by lymphoid leucosis and that the two diseases were etiologically unrelated.

The upshot of this work and Peter's leadership was that, for the first time, MD could be prevented and controlled by vaccination – a development of huge importance to the world's poultry industry. In 1964, Peter and Jim Payne shared the Tom Newman International Poultry Award for their research. Many further prestigious awards from the poultry sector, veterinary profession or UK science-led organisations followed. Indeed, in 1976, Peter was elected as a Fellow of the Royal Society and in 1987 was honoured as a Commander of the Most Excellent Order of the British Empire (CBE) for his services to science.

Peter's scientific leadership was recognised widely and, in 1974, he replaced Dr Bob Gordon as Director of HPRS and steered the institute through

a particularly challenging period of marked scientific, economic and political changes. In 1986, the funding body (Agricultural and Food Research Council) chose to amalgamate their four research council-run animal disease research institutes into a single institute and Peter was appointed the first Director of the Institute for Animal Health (IAH).

Peter was born in Petersfield, Hampshire in 1926, and was initially educated at home in a small school run by his mother until he went to the preparatory school for Totnes Grammar School and was then a boarder to Bedales School where his father was Director of Music. In 1940, Peter was evacuated to Massachusetts, USA and graduated from a progressive school in 1944. While he joined the Royal Air Force as a trainee for aircrew (being demobilised in 1948), his career choice had moved to the area of veterinary practice and he graduated from the Royal Veterinary College (RVC) in London. While at the RVC, he was particularly drawn to the study of viruses and cancer and, most specifically, the text *The leucosis of fowls*

RETURN TO CONTENTS

and leucaemia problems published in 1922 by Ellerman and Bang.

Internationally, Peter was an esteemed collaborator and communicator and he helped establish both the World Veterinary Poultry Association (WVPA) and, in 1972, its scientific journal *Avian Pathology*. Peter was initially Secretary/Treasurer of the WVPA but was soon appointed Editor-in-Chief of *Avian Pathology* and continued until 1987. In 1981, Peter was elected President of the World's Poultry Science Association.

His other honours included the BOCM Poultry Science Award (1968), the JT Edwards Memorial Medal of the Royal College of Veterinary Surgeons (1969), the Dalrymple-Champneys Cup and Medal (1973), the Bledisloe Veterinary Award of the Royal Agricultural Society of England (1977), the Wooldridge Memorial Medal of the British Veterinary Association (1978), the Joszef Marek Memorial Medal (1979), the Central Veterinary Society Victory Medal (1980), The Wolf Foundation Prize in Agriculture (1989) and the Chiron Award of the British Veterinary Association (1999).

Peter shared more than 70 years of his life with his wife Jan, the daughter of great friends of his parents who Peter had known since early childhood. They married in 1950 and, as a couple, they were incredibly supportive of institute life and HPRS especially benefitted hugely from the affection and high regard they had for both the laboratory and its staff.

In retirement, Peter still remained highly active in science and his roles included appointment as a Professor-at-Large at Cornell University for six years, appointment to the Executive Committee of the UK Institute for Biology, subsequently becoming President, appointment as a Vice President of the British Veterinary Association, appointment as a member of the Council of the Royal Society and he was chairman of Red Tractor poultry technical committees and the British Egg Marketing Board Research and Education Trust, a role he relinquished only in late 2019.

Peter was a good sportsman and a regular for the HPRS squash team. In later years, he sang in a local choir and even into his 90s he would attend choir practice after a day's committee work.

Peter died in December 2021 and Jan died in May 2022. They are survived by two sons, Andrew (a veterinarian specialising in bovine health) and John (an electronic engineer). A daughter, Alison, predeceased them.

Peter left a legacy of many scientists he mentored, a strong UK competence in poultry disease research, especially into MD and tumorigenesis, a world-renowned scientific journal and, as part of the rebuilding programme at the Pirbright Institute, a new standalone poultry experimental facility named the Biggs Building in recognition of Peter's contribution to avian science.

Dr Martin W Shirley CBE

Consultants: new appointment offers

The following appointments have been offered and are subject to acceptance by the applicants. The lists are prepared by the College's Workforce team, on the basis of returns completed by College assessors on consultant advisory appointment committees submitted by 27 May 2022.

Please note, we receive no return following 20% of AACs. Any forms received after 27 May 2022 will be published in the next issue. If you do not take up your post or have additional information, please inform the Workforce team. Whenever you move home or job, please inform the Membership team.

Haematology appointments

Region	Employing body	Base hospital	Appointee
East Midlands	University of Nottingham	University of Nottingham	Dr Emily R Chernucha
	Sherwood Forest	King's Mill	Dr Melanie Willcocks
	University of Nottingham	University of Nottingham	Dr Mark J Bishton
Kent, Surrey and Sussex	Maidstone and Tunbridge Wells	Maidstone	Dr Arunodaya Mohan
North, Central and East London	Barts	across sites	Dr Katie L M White
South London	King's	Princess Royal and Denmark Hill	Dr Paula L Garland
South West	Royal Cornwall	Royal Cornwall	Dr Christopher G Brammer

RETURN TO CONTENTS

Ceilular pathology appointments

Region	Employing body	Base hospital	Appointee
North West London	The Royal Marsden	The Royal Marsden	Dr Justin N M Weir
North West	Liverpool	Royal Liverpool University	Dr Olusola J Daramola
South West	North Bristol	Southmead	Dr Monika E Beauchamp
West Midlands	University Hospitals of North Midlands	Royal Stoke	Dr Sarah Waring
Yorkshire and The Humber	Leeds Teaching	St James'	Dr Peter M Ellery

Paediatric pathology appointments

Region	Employing body	Base hospital	Appointee
Yorkshire and The Humber	Sheffield Children's	Sheffield Children's	Dr Antony F Cousins

Medical microbiology, infection and virology appointments

Region	Employing body	Base hospital	Appointee
North, Central and East London	Barking, Havering and Redbridge	across sites	Dr Rekha Lopez
	Barts	across sites	Dr Diana Ayoola O Mabayoje
South London	Guy's and St Thomas'	Guy's and St Thomas'	Dr Iain Milligan
	Lewisham and Greenwich	across sites	Dr Francesca Ferretti
		across sites	Dr Anand Odedra

Clinical biochemistry appointments

Region	Employing body	Base hospital	Appointee
Yorkshire and the Humber	Sheffield Teaching	across sites	Dr Edmund J Rab

Examination results

Successful candidates for the Part 1 examination

The following candidates have passed all components of the relevant Part 1 examination:

Clinical biochemistry

Mariana Abdel-Malek
Mohamed Ahmed
Abd Alrasol Al Hasan
Iman Al-Harthi
Seema Ali
John Bassett
Helen Beeston
Angela Boal
Naomi Angharad Carne
Lauren Carroll
Oluwayemisi Esan
Colleen Flannery
Jennie Freestone
Diana Han
Charlotte Harborow
Wah Wah Kyaw
Katie Malton
David Marshall
Eamon McCarron
James Osborne
Emma-Louise Reid
Christina Soromani
Fiona Vaz
Jack Kevin Whitewood
Aruni Kanchana Wijesinghe
Ffion Wood
Amy Wotherspoon
Wei Yang

RETURN TO CONTENTS

Haematology

Wail Abdelmonem Gadelseed Abdelrahman
Oluwaseun Oyetope Ibukun Akinpelu
Hannah Al-Yousuf
Nida Anwar
Ala Omar Abdulrahman Ba Wazir
Mohsin Badat
Ankhi Barua
Sarah Ahmed El Sayed Bassiony
Sarah Borg Savona
Nuno Borges
Jordan Burgess
Shoshana Burke
Li Yuan Chan
Grace Collord
Francesca Crolla
Venetia Alice D'Arcy
Aoife Dervin
Naeem Desai
Akshay Deshpande
Tania Dexter
Ahmed Elsaid
James Fay
Vishaka Gorur
Noor Haris
Heyam Hashim
Elizabeth Hutchinson
Asmaa Mohsen Elsayed Ismail
Hussain Janan
Yanrong Jiang
Nehal Joshi
Shasha Khairullah
Pyae Phyo Lwin
Fiona Lynott
Gihan Nabil Ahmed Mahmoud
Adrian Maraj
Elizabeth Marrinan
Jonathan Massie
Laura McDonald
Kathryn McVinnie
Eitan Mirvis
Laura Munglani
Ghulam Murtaza
Niamh O'Connor-Byrne
Roseann O'Doherty
Dina Nader Mutwakel Osman
David Palmer
Sandeep Potluri
Matthew Poynton
Manmeet Singh Randhawa
Himabindu Rebbapragada
Gavinda Sangha
Hassan Shabbir
Louisa Shackleton
Harriet Sharp
Giulia Simini
Manjula Sinnakirouchenan
Ranjan Tiwari
Oliver Tomkins
Olga Tsiamita
Vajira Nalanie Udalamaththa Gamage
Mevish Ul-haq
Natasha Jane Noice Wetherall
Yamuna Wasanthi Wickramasinghe
Sophie Zemenides

Histopathology

Asmaa Ahmed Mostafa Ahmed Abdelkerim
Thomas Kuzhiparampil Abraham
Ala Abu-dayeh
Mufuliat Adeola Adesanya
Tharangi Ahangama Vithanage
Alaa Khalid Eltayeb Ahmed
Khamaeel Khaleel Faraj AL Lami
Sara Al Shehhi
Oday Al Younes
Hassan Alahmadi
Jafrin Alam
Azal Abduealgader Abduealrhman Barbid Al-Amoudi
Refka Al-Dahhan
Zainab Al-dubbaisi
Maiadah Alezzi
Hanan Ali
Rabia Ali
Nabaa Abdulkareem Al-idan
Maryam Almousa
Aseel Almsai'dein
Motaz Alnatsha
Jameel Alnemari
Aseel Al-Omari
Sadeem AlSubaie
Ghaida Alsugair
Nouria Alteggazi
Nivetha Ambalavanan
Madeeha Anwar
Fatima Anwar
Sithara Aravind
Divya Arora
Noushad Aryadan
Rebecca Tian Mei Au
Reem Aziz
Andrei Bancu
Chamali Malhari Baranasuriya
Muhammad Rizwan Bashir
Ahmed Basma
Ayma Batool
Alireza Behzadnia
Chris Bell
Riti Bhattacharya
Raghad Bokhari
Daniel Enrique Castro Vela
Neelima Challagundla
Hoi Tung Chan
Wing Hung Anthony Chan
Tzy Harn Chua
Cheryl Coulter
Tharwat Dajani

RETURN TO CONTENTS

Siddarth Dave
Simon Deacon
Prabal Deb
Divya Shanti Deth
Hadeel Dherat
Yasin Dhonye
John Drake
Keir Edwards
Nada El Garhy
Krithika Elangovan
Ala Elidrisi
Mohamed El-kherbetawy
Isaac Joe Erskine
Humaira Erum
Harriet Evans
Bilqees Fatima
Aislin Francis
Claire Elizabeth Vera French
Ching Ki Fung
Pradeepa Gayani Gam Hewage
S.B.K Gamage
Elinor George
Sala Hamandi
Syed Asif Hashmi
Tin Wai Ho
William Ryan Huddleston
Dina Hussein
Donato Iacovazzo
Andrew Irvine
Sherine Refat Mohammad Ismaeel
Sumi J S
Miheer Jagtap
Nagalakshmi Jegannathan
William Jervis
Gamarallage Indumini Maheshika Jinadasa
Hannah Jones
Hemangi Joshi
Chinnu K J
Yash Kale
Jayanthi Kamashi S
Samalai Kanagasabapathy
Renu Karki Chettri
Kalpana Kumari Kasturi Muddhureddyhali
Jasneet Kaur
Minhaj Khan
Sana Ullah Khan
Umair Aslam Shahzad Khan
Hardik Khandelwal
Amy Kitchener
Rashmi Kondapalli
Unnat Krishna
Carol Kwon
Emma Katherine Leeman
Bhagya Lekshmi A.K
Joseph Lewis
Hung Wai Li
Amy Llewellyn
Sungjemla Longkumer
Fabrice Ly
Bifica Sofia Lyngdoh
Hansavika Prasadinie Maddumage
Bhulaxmi Madur
Rania Makboul
Ihala Wellala Gunawardena Arachchige Lab Malhasi
Dr Shaheera Malik
Kerima Divita Manantan
Essam Mandour
Hamza Mansur
Vidya Manur Narasimhamurthy
Bayan Maraqa
Olivia McCabe
Francesca McDowell
Ailsa McNab
Sri Hansini Meenakshi Sundaram Baskar
Saja Laith Mikhlif
Astrid Lovita Miranda
Prabhashankar Misra
Dina Mohammed Adel Ibrahim Radi
Katherine Moor
Anna Moore
Sagar More
Benjamin Francis Moxley-Wyles
Yousef Msaddi
Megha Murali
Ara Azad Mustafa
Kavitha Bali N
Maria Naseem
Maryam Nisar
Sindhura Nugala
Olubanji Oguntunde
Shweta Pai
Kanesh Rajoo Paramasevon
Amruta Patil
Rakesh Patkar
Zubaria Rafique
Papiya Rahman
Sreeja Raju
Rakhee Ramachandran
Sudhakar Ramamoorthy
Usha Rani
Rahma Rashid
Nikhil Ravikumar
Zita Reisz
Martin Reynolds
Benjamin Henry Roberts
Gabrielle Rogan
Sam Romaine
Christopher Ross
Sarah Ruane
Oliver Rupar
Sithara S
Arham Saadeh
Rafal Saeed
Cansu Beril Sahin
Akshay Sahodree
Doaa Salem
Adikari Appuhamillage Shirani Samaratunga
Taha Cumhan Savli
Mithraa Devi Sekar
Saloni Naresh Shah

RETURN TO CONTENTS

Mayank Sharma
Rashim Sharma
Laxmi Shivadas Menon
Fabiola Sica
Manimegalai Singaram
Kalpana Singh
Shyamini Sooriyaarachchi
Vindu Srivastava
Oreoluwa Suleiman
Madiha Syed
Anu T R
Aisha Tabassum
Taysseer Abd El-Hamid Talab
Raghad Tallab
Alfonso Tan Garcia
Jonathan Tang
Atisha Tank
Supanya Thanansayan
Deepa Mary Thomas
Sajitha Thoufeek
Pyae Phyo Thu
Haleema Beegum Thundathivilayil Rahiya
Naymar Dayana Torres
William Tracey
Po Man Tsang
Aarti Tyagi
Geethika Ullas
Sana Umar
Anna Uzzell
Fouzia Kauser Vali
Keima Vallely
Maithreyee Vipulananthan
Sara Wajdi Ibrahim
Thushani Nelka Warusavithana
Erin Whyte
Thilini Wathsala Wijesiri
Mark Wilkinson
Francis Hong Xin Yap
Fiz Za

Immunology

Anne Boulton
Catherine King
Ki Lam
Dylan James Mac Lochlainn
Jennifer Mulhall
Katherine Townsend

Infection

Kuruppuge Dona Sevwandi Thejani Abeywardana
Kiranmai Bhatt
Sara Elizabeth Boyd
Arthur Clegg
Dami Collier
Suny Coscione
Anna Crepet
Hannah Dabrowski
Tamador Elamin
Tom Fieldman
Imogen Fordham
Nitin Gupta
William Hamilton
Haruna Hassan
Francesca Heard
Luke Hunt
Uchechika Anuri Nathalie Iroegbu
Edwin Justice
Tanmay Kanitkar
Luke Mair
Marios Margaritis
Emily Martyn
Alice Maxwell
Brian McCann
Ellen Mekonnen
Mariya Molai
Hannah Mooney
Daniel Mosby
Clemency Nye
Ailva O'Reilly
Akaninyene Otu
Scott Pallett
Nisha Ranganathan
Harriet Runcie
Noorann Sheikh
Donald Somasunderam
Germander Soothill
Joseph Thompson
Maya Tickell-Painter
Emma Williams
Catherine Wilson
Meng-san Wu

Medical microbiology & virology

Saied Mohommed Ali
Baby Kanwal Baloch
Caoimhe Brennan
Chiu Hang Chan
Pramod Chhabrani
Anne-Marie Dolan
Hajra Farooq
Wathsala Dayanthi Galagedara
Jayathri Galappaththi
Dua'a Ghabashineh
Emily Glynn
Neha Gupta
Tamara Hoban
Rushana Hussain
Alwasila Taha Alnatig Idris
Jayalath Abewardhana Mudiyanselage Anura Jayatilake
Brian Keogan
Fiona Ryan
Mary Kalliath Varghese
Dharunee Weerakoon

RETURN TO CONTENTS

Oral pathology
Manas Dave
Wei-Ning Saik

Veterinary clinical pathology
Strahinja Medic

Successful candidates for the Part 2 examination

The following candidates have passed all components of the relevant Part 2 examination:

Clinical biochemistry
Joseph Bailey
Helen Cordy
Emma Dewar
Lyn Douglas Ferguson
Jonathon Howe
Amanda Ay Jia Lam
Eleanor McLaughlan
Francesca Anne Meakin
Sadie Jane Redding
Ellen Rumsby
Laura Russell
Andrew Kenneth Teggert
Eloise Anna Willis

Forensic pathology
Megan Jenkins
Thomas Raymond Albert Prickett

Genetics
Katherine Jane Glover
Laura Ions
Kate Alice Sergeant
James Oliver Tellez
Elizabeth Young

Haematology
Fatma Mohamed Albulushi
Ahmed Youssef Mohamed Badawi Amer
Rodothea Amerikanou
Luke Attwell
Martin Best
Jesca Boot
Sally Bugg
Jennifer Darlow
David Davies
Saniya Dhawan
Katrina Dodds
Sammy Fergiani
Kate Fletcher
Melissa Friday
Asterios Giotas
Harshita Goradia
Benjamin John Gray
Caroline Grist
Daniel Halperin
Richard Hinton
Gillian Abigail Horne
Kameta Imaeva
Deena Iskander
Sarah Jaafar
Ganesh Kasinathan
Sally Keat
Megan Kell
Naveeda Khaliq
Katja Kimberger
Alison Laing
Ho Pui Jeff Lam
Sarah Yi Li Leong
Loredana Gabriela Mihailescu
Mohd Shahrin Mohd Noh
Smeera Nair
Mairead O Donovan
Mary Oyesanya
Catherine Page
Omer Pervaiz
Keir Pickard
Maya Raj
Kavita Ramlochan
Patrick Russell
Lakshmi Sasikumari Pillai
Thomas Seddon
Sobia Sharif
Hisam Siddiqi
Zar Ni Soe
Priya Sriskandarajah
Yishi Tan
Yan Chin Tan
Joseph Taylor
Micky Tsui
Hayat Ullah
Sobia Umar
Indrani Venkatadasari
Shehana Wijethilleke

Haematology clinical science
Hani Bibawi

RETURN TO CONTENTS

Histocompatibility & immunogenetics

Thomas Oliver Mark Browne
Catherine Hastie

Histopathology

Nashwa Al Kindi
Ola Mohammad Al Waqfi
Fatima Salih Saeed Ali
Abethan Anparasan
Balal Arif
Raluca Daniela Badea
Rajeswary Balagopal
Adarsh Barwad
Azra Bashir
Pallavi Vijay Borkar
Marian Burr
Pascale Capleton
Anu Chawla
Caroline Cecelia Colville
Sam Nicholas Pooley Cook
Wei Cope
Niall Corry
Kate Dinneen
Adam Palmer Douglas
Lauren D'Sa
Mohamed Elshiekh
Jessica Eyssautier
Suzanne Foster
Jyotsana Harit Gaur
Abhisek Ghosh
Ishitha Gunadala
Nilakshi Gupta
Conrad Hayes
Cassandra Hill
Adeyemi Idowu
John Jackson
Archna Jain
Emily Joslin
Maryam Jameel Kakil
Kumaresan Kathamuthu
Aniruddha Ketkar
Ella-Grace Kirton
Zuhara Shemin Kooloth Mahamoodh
Amy Leeming
Hoi Ki Leung
Kanchana Sanjeewani Liyanaarachchi
Weihong Ma
Nuzhat Khatoon Manzoor Ali
James McCaffrey
Aml Mousa
Ruchi Nasa
Isma Noaman
Sadaf Noor
Chara Ntala
Charlotte Rachael Oliver
Jayalakshmy P l
Vinita Pandey
Aafia Qasim
Lubna Rafiqi
Athulya Raj
Swapnil Ulhas Rane
Sameera Rashid
Safana Sadaf
Nishant Sagar
Hijab Shah
Rania Showeil
Karunanayake Gayathri Hiroshi Silva
Aishwarya Sitaram
Elizabeth Ann Stannard
Amutha Janaki Subramanian
Robert Benjamin Templer
Zoe Tomaszewski
Sumedha Vats
Caroline Young
Asma Zafar

Immunology

Salma Alamin
Emma Callery
Fatima Dhalla
Anthony David Peter Dorr
Jacklyn Sui

Medical microbiology

Mridu Anand
Shamma Arora
Anna Maria Amanuah Aryee
Robert James Ball
Janine Carter Sarah
Denny Farhan Fazal
Elena Ferran
Eliza Gil
Elaine Houlihan Julie-Anne Houlihan
Su Su Htwe
Francesca Knapper
Charlotte Milne
Clare Moore
Thomas Morris
Elizabeth Parker
Vinesh Patel
Pooja Ravji
Daniel Stevenson
Aye Thar Aye

Molecular pathology

Joanna Farrugia

RETURN TO CONTENTS

Neuropathology
Jillian Sarah Davis
Neil James Papworth

Oral pathology
Stephen James Brown

Toxicology
Jennifer Rachael Barnes

Veterinary clinical pathology
Daniel Castillo

Virology
Intisar Alshukri
Amanda Bradley-Stewart Fiona
Jane Hamilton Christine Kelly
Baljit Saundh
Igor Starinskij
Oliver Toovey
Jonathan Youngs

Successful candidates for the Certificate Examinations

The following candidates have passed the Certificate in Higher Autopsy Training:

Marguerite Carter
Jennifer Garry
Patricia Gou
Grainne Heuston
Jonathan Lye
James Matossian
Mark McCabe
Shima Mohamed
Sarah Maire Ni Mhaolcatha
Louise Osgood
Robert James Pell
Zoë Rivers
Vivek Sekhawat

The following candidates have passed the Certificate in Medical Genetics:

Jamie Campbell
Alexander Deng
Katharine Edgerley
Rebecca Hall
Zerin Hyder
Rachel Irving
Vardha Ismail
Neeta Lakhani
Zena Lam
Harry Leitch
Caoimhe Mckenna
Catarina Olimpio
Filip Ostrowski
Melody Redman
Monisha Shanmugasundaram
Charlotte Sherlaw-Sturrock

The following candidates have passed the Combined Infection Certificate Examination:

James Barnacle
Andrew Eugene Blunsum
Anna Daunt
Ashwin Delmonte Sen
Alison Ellwood
Muhammad Fahad
Francesca Ferretti
Aidan Hanrath
Jeffrey Harte
Lois Hawkins
Rania Khalil
Venkat Ramesh
Daniella Ross
Julian Rycroft
Janet Scott
Christopher Smith
Dominic Wakerley
Aline Wilson
James Wilson

Claire Mason
Nicolas Massie
James Millard

RETURN TO CONTENTS

International Conference of Kurdistan Society of Pathology

Dr Maysa Al-Hussaini

The second International Conference of Kurdistan Society of Pathology highlighted the continuing success in working to support international pathologists in their training, with talks emphasising the importance of quality management. Dr Maysa Al-Hussaini shares an overview of this inspiring event.

In-person events return

The Royal College of Pathologists co-hosted the second International Conference of the Kurdistan Society of Pathologists, which was held on 31 March and 1 April 2022, at Erbil Rotana Hotel in Kurdistan, Iraq. Following the first meeting in 2019, the conference was conducted in person and was well attended with delegates from all over Iraq, including pathologists in training and consultants at various levels of seniority. The main agenda was quality in pathology services, along with other topics including breast pathology, haematopathology, haematology and blood banks, microbiology and COVID-19-related topics. Several local and international speakers participated in delivering lectures and case presentations.

The importance of quality management

At the opening ceremony, Professor Al-Hussaini delivered a speech under the patronage of the Health Minister for Kurdistan, along with the Governor of Erbil, the President of Salah Elddin University and a further range of eminent healthcare professionals from Kurdistan. The College and the Kurdistan Society of Pathology emphasised the importance of quality management of laboratory services as this is a key focus when following a patient-centred approach. Topics covered included an 'Overview of ISO15189 Laboratory Accreditation', an 'Overview of Quality Management Systems', 'Risk Management and Governance in Pathology, from Mesopotamia to the Modern World' and 'Quality Management at the Surgical Pathology Laboratory'.

Celebrating RCPath's Diamond Jubilee

2022 marks the Diamond Jubilee of the College – a brief journey through the College's 60 years of achievements was provided. The College has played an important role in supporting the training

Dr Saran Nooruldeen (right), the President of the conference, alongside Dr Maysa Al-Hussaini (left), the RCPath International Regional Advisor for the MENA region.

RETURN TO CONTENTS

A group photo of the attendees with the speakers and organisers.

and certification of many international pathologists, including those in Iraq. I delivered a detailed talk on the role of the College and the international office and committee in this endeavour. This included listing the services, activities and schema the international office provides. An update on examination and curricula was provided.

Inspiring training

The College offered continuous professional development (CPD) credits for attending the conference. Dr Saran Nooruldeen, the President of the conference, expressed her delight and gratitude to the College for supporting the event, as this added credibility to the event and encouraged many to attend. The lecture was very well received. Many Iraqi pathologists came to ask for more information about training and examinations. Furthermore, the Iraqi Society of Hematology wondered about the possibility of signing a memorandum of understanding with the College for training.

Dr Maysa Al-Hussaini
RCPath International Regional Advisor for the MENA region

Digital pathology and service design: the Digital Pathology & AI Congress

The panel discussion held during the 8th Digital Pathology & AI Congress in London (1–2 December 2021) explored how good design practice principles can contribute to deploying and sustaining digital pathology, along with the effective integration of artificial intelligence into the diagnostic workflow.

Digital Pathology & AI Congress

Digital health solutions in general have a poor track record of being sustained once they are implemented, often resulting in abandonment of the technology.[1,2] Current digital pathology and artificial intelligence (AI) deployments strategies are generally too IT-focused – the technology being the focus, rather than the people and environment into which they are being deployed.[3] Furthermore, a focus on technology alone will also hamper the effective integration of AI tools into the diagnostic workflow. Looking ahead to how AI can best be deployed, we will need to ensure effective mechanisms to appraise the technology, ensure the avoidance of bias and address ethical and medicolegal issues that will arise with use of AI as a diagnostic tool. We will also need to have appropriate educational and training resources

RETURN TO CONTENTS

to promote user and stakeholder confidence with how the AI operates in their specialty and healthcare as a whole.

What role can service design play in digital pathology?

Professor Cain reminded us of a Cedric Price quote: *'Technology is the answer but what was the question?'*

She suggested that the challenge of designing a digital pathology service is knowing what the requirements of digital pathology deployment are. It is important to first consider the human factors that are an intrinsic part of deploying innovation to start with, rather than focusing on the technology and facilities. In this respect, it is useful to look outside of healthcare to see what we can learn from other sectors that are deploying technologies that can impact people in the workplace. Fundamentally, services are centred on people and experience and so developments need to be co-creative – created from the bottom-up, holistic, transdisciplinary and integrative – bringing together different disciplines to address a complex, systemic problem.

In pathology, we are familiar with working in multidisciplinary teams. A transdisciplinary team provides a platform for incorporating new ways of thinking by working with colleagues from disciplines outside of those we conventionally work with in digital pathology, such as pathologists, biomedical scientists, computational scientists and IT support.

By widening the make-up of digital pathology deployment teams to include designers, we would hope to provide a new understanding of the relationship between science and society to transcend disciplinary views and enable critical reflection to create new knowledge.

Incorporating design specialists into digital pathology and AI deployment projects brings with it the application of design tools (such as customer journey maps, personas, stakeholder maps, service blueprints) and so allows exploration and reframing of challenges. This provides opportunities to investigate the perceived benefits or disadvantages of a technology.[4] Designers will ask focused questions that look at the deployment holistically. They can use the 'How Might We?' (HMW) question to reframe challenges. In the case of digital pathology, the HMW could be:

- HMW re-imagine and co-create meaning and value in digital pathology for all stakeholders?
- HMW use technology to enhance human experiences within digital pathology?

For each of these questions, Professor Cain highlighted the need to know if digital pathology must look outside of its own discipline and, if so, which disciplines should be involved.

Understanding technology and innovation

Dr Jun reminded us that the digital revolution has huge potential in healthcare. If done well, it can support clinicians in decision-making, generate predictions, improve inefficiency in care management and radically transform the way care is accessed and provided. However, it is also clear that innovations do not always work, as seen in past examples including telehealth and care technologies, which were purchased by local authorities but left unused and even unpacked.

This arises because of a primary focus on the technology rather than understanding deployment in the context of the overall system. A mismatch also often exists between existing systems and new technologies, which further compounds the challenges such as poor interoperability, usability or consideration of implementation within the system. This mismatch can lead to disruption of care delivery and even contribute to stress and burnout in clinicians or harm to patients.

There is a need to move from the technology -focused view to a systems perspective, especially for AI deployment. The former tends to focus mainly on data quality, bias in data, algorithm accuracy and human versus machine performance. On the other hand, a systems perspective provides a more holistic approach involving multiple stakeholders. It considers the following issues highlighted in a white paper on human factors and ergonomics in healthcare AI:[5]

- how AI can help people to be better aware of their situation
- how people can appropriately interpret automated decisions made by AI
- how AI and people can work as a team
- how trust can be built between AI and people and what ethical concerns can be raised.

Importantly, the system perspective asks basic questions that provide the basis for effective technology deployment:

- can this person do these tasks with these tools and technologies
- can these tasks be performed under these conditions, to these standards and with this training?

It therefore links the technology with the task it is intended to support the people using it, their organisation and environment.[6] As such, a systems perspective should be used from the outset of a project and should not be an afterthought. This will require involving various stakeholders including patients, carers and professionals in the technology deployment and development process. Technologies can be designed for stakeholders by informing, consulting or engaging them in the design process, but ideally technologies can be codesigned with them, if possible. There can be many challenges in

RETURN TO CONTENTS

involving vulnerable patients or extremely busy healthcare practitioners, but designers have been creatively finding ways to achieve pragmatic and purposeful engagement of various stakeholders.

Summary

The panel discussion proposed that the effective deployment of digital pathology and integration of AI into the diagnostic workflow should be facilitated by working with colleagues with design expertise. This transdisciplinary approach recognises that the complex nature of technology deployment in healthcare is fundamentally people- and experience-centric. The subsequent integration of AI into the diagnostic workflow will also need to refocus attention – drawing it away from a purely technological focus to a more holistic systems approach that recognises how and even if AI is the appropriate technology for all diagnostic pathways.

Q&A

In the Q&A session with the audience, we discussed the importance of being able to visualise AI tools so that pathologists and other users can better understand their operational status and validity. We also discussed how recreating a pathology environment and workflow that is more engaging would have benefits for staff and patients. A particular point of discussion was around the time people needed to innovate in their workplace. A contributor commented: *"We can't articulate what we want because we don't have time to come out of the day job"*.

It was interesting to hear input from Professor Cain and Dr Jun, who indicated that they must find creative design strategies to engage with busy people. This can be accomplished by creating engagement with smaller teams and planning at the outset to only take a short amount of people's time during consultations. Professor Cain discussed her experience of engaging with time-poor staff; one of the approaches is that designers take their research to the time-poor staff and plan for studies to require short contributions from busy staff.

Professor Cain challenged us to ask the following question: 'What could digital pathology achieve if it worked with others from different disciplines in a human-centred and co-creative way?'

The panel discussion was a conversation starter, and we hope that we can follow this up with more discussion among colleagues. We are happy to receive comments and to discuss joint projects in this area. It was certainly agreed that digital pathology and AI are only tools, and their impact will depend on how effectively we deploy them in clinical practice. We believe we can best do this collaboratively and with colleagues outside of our immediate disciplines.

A recording of the panel discussion is available here.

References available on our website.

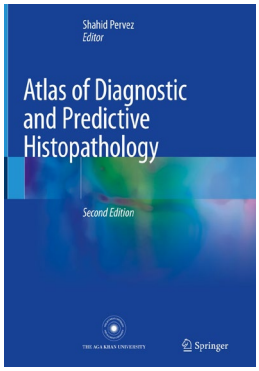
Samar Betmouni
Consultant Neuropathologist, Sheffield Teaching Hospitals NHS FT

Luisa Motta
Consultant Dermatopathologist
Salford Royal NHS Trust

Gyuchan Jun
Reader in Socio-Technical System Design
School of Design & Creative Arts, Loughborough University

Rebecca Cain
Professor of Transdisciplinary Design
School of Design & Creative Arts, Loughborough University

RETURN TO CONTENTS



BOOK REVIEW Atlas of Diagnostic and Predictive Histopathology

By Shahid Pervez
Springer Singapore, 2020

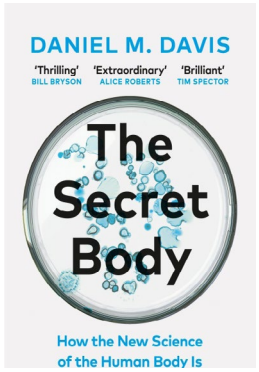
£219.99, 517 pp, hardback
ISBN: 978-9811-51219-3

The second edition of *Atlas of Diagnostic and Predictive Histopathology* is a compilation of high-yield, at-a-glance summaries, providing a comprehensive yet compact resource for newcomers to histopathology, as well as for practising pathologists. Its 16 chapters cover all organ systems with an additional unconventional yet highly relevant chapter on 'Predictive Pathology'. Besides basic organ system pathology, it also helps in developing an approach towards accurate diagnoses. I particularly like that each entity is covered with an adequate number of high-resolution images with insets showing higher magnifications, as well as immunohistochemistry (IHC) and other ancillary testing. No more, no less.

I have observed that trainees of histopathology find the book very valuable in a variety of ways, i.e. as a quick reference with salient morphological features on haematoxylin and eosin stain, pertinent IHC, special stains and molecular genetics including fluorescence in situ hybridisation images, where relevant. Liberal use of annotations allows the reader to understand a particular morphological feature in a great depth. Additionally, it has been found very useful as revision material for fellowship examinations and includes an illustrated guide for routine reporting of biopsies.

This is an era where the role of pathologists has become much more dynamic and versatile, along with an explosion of knowledge and ever-increasing thickness of specialised textbooks and online resources. This book, however, is a very concise and thoroughly updated resource for pathology trainees and consultants for developing their diagnostic skills and sharpening their knowledge.

Dr Akhtar S Chughtai
Professor of Pathology
Chughtai Institute of Pathology, Pakistan
CEO, Chughtai Lab



BOOK REVIEW The Secret Body

By Daniel M Davis
Penguin Vintage, 2021

£20.00, 224 pp, hardback
ISBN: 978-1847-92569-5

In an era of exciting studies and scientific breakthroughs, *The Secret Body* by Daniel M Davis reviews how our understanding of diverse topics has evolved and accelerated over the most recent decades right up to the modern day. From neonates to neurons, microscopes to microbiomes, the breadth of the book is large and provides some interesting insights into different fields of medical science.

Each chapter of the book relates to a different topic, taking the reader through their histories, culminating with the most up-to-date thinking. The book is highly researched and well referenced with an easy-to-follow sequence of events. There are frequent references to very up-to-date sources, sometimes with a personal touch, making you feel like you are in a contemporary world of discovery.

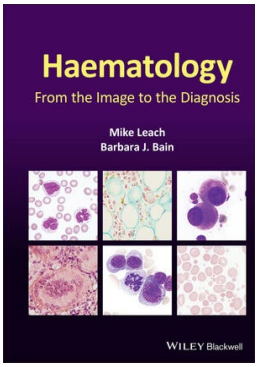
This book is extremely accessible and assumes that the reader has no previous scientific knowledge. While this might be an appealing read to the lay public, as a haematologist, some of the themes felt less original, although some of the recent discoveries were not previously known to me. The book tends to jump around between ideas, with conclusions to each section perhaps coming across as a little melodramatic.

Having said that, the ideas are clearly explained with easy-to-understand explanations about scientific principles. Notably, Davis explains in detail how microscopes were first developed and follows their path of evolution to vividly explain how we are now able to understand cellular structures on such a minute level that was never previously considered. We are also taken through the world of neural science, encountering the huge difficulties in mapping neurons and learning how a collaborative project around the world is bringing us closer to a greater overall understanding.

Overall, this book is an easy to follow and often thoughtful journey through the secrets of the body. It covers a wide range of topics and highlights the most recent discoveries of the modern day. While the book is probably best suited to those with a non-scientific background there will still be many things to discover within its pages for those with medical or scientific knowledge too.

Jennifer Darlow
Paediatric Haematology ST6
Royal Manchester Children's Hospital

RETURN TO CONTENTS



BOOK REVIEW Haematology: From the Image to the Diagnosis

By Barbara J Bain, Mike Leach
Wiley-Blackwell, 2021
£89.99, 304 pp, hardback
ISBN: 978-1-119-77750-2

Haematology: From the Image to the Diagnosis is a comprehensive collection of curated clinical vignettes which highlight the paramount importance of 'astute morphological acumen' in navigating through the diagnostics of challenging clinical cases.

We live in an era where next-generation sequencing and nifty molecular techniques seem to be the de rigueur of many haematological diagnoses (particularly among the more current generation of trainees), which have seemingly outsmarted microscopy and morphology, misperceived as antiquated, vestigial bygones. This book is a timely and urgent intervention – reiterating the indispensability of this valuable diagnostic tool in our investigational armamentarium.

Co-authored by Mike Leach and Barbara Bain (the cognoscenti of blood cell morphology), this compendium of 101 eclectic cases – complete with high-resolution images and real-life clinical narratives – irrefutably puts 'meticulous morphological assessment' of cells in blood, marrows and tissue fluids back at the helm of haematological diagnoses. Be it the cup-shaped blasts of NPM1-mutated acute myeloid leukaemia that masquerade as acute promyelocytic leukaemia on flow plots or leishmaniasis incognito cloaked as possible lymphoma, the cases make an intriguing and riveting read.

The succinct descriptions of the inset images are well synchronised with clear diction of the detailed clinical commentaries, which facilitate integrated learning and reporting – the vital conduit that bridges the bench to the bedside. The whittling down of differential diagnoses based on morphological features, along with the warnings about possible diagnostic pitfalls in many cases, is a true bonus.

The multiple-choice questions at the end of each case with two possible correct answers help the invested reader to consolidate and reflect on the diagnostic trajectory of each patient chronicle.

This book is a 'must have' on the bookshelf of all clinicians and scientists who identify haematology as their calling and vocation.

Dr Vishal Jayakar
Consultant Haematologist, Kingston Hospital NHS Foundation Trust
Lead for Commercial Education & Training, Kings College Haematology Health Partners
Honorary Senior Lecturer, Imperial College, London

RETURN TO CONTENTS

Legacies

Daniel Ross

The objectives of the College are to develop and maintain high standards of pathology education, training and research; promote excellence and advance knowledge in pathology practice; increase the College's influence through a clear, coherent, professional voice; and resource the future of the College.

Financially, the College aims to match activities to projected income. The College is funded from subscriptions, examinations and related fees, investment income, grants from outside bodies and charitable donations.

Bequests or legacies are always gratefully received. Leaving a gift to charity in your will is a very special way of helping to secure the future for organisations such as the Royal College of Pathologists. Legacies to the College have the added benefit of being exempt from inheritance tax.

An open legacy may be made toward the general purposes of the College. This is preferred because it allows the College to apply the funds donated where the need is greatest at the time the legacy eventually becomes available. This can be quite different from the perceived need when a will is made. However, you may legally oblige the College to spend the money in a particular area of College work or for a specific purpose by making a restricted legacy.

The College undertakes many educational initiatives. We are actively undertaking an outreach programme that spreads the awareness of pathology throughout the UK and abroad. No other UK college has committed so much time and resources to the future of our profession. This will promote the importance of pathology to the grassroots of this country through schools, colleges, hospitals and many other sites where the general public can have access to important healthcare information.

If we are to safeguard the future of our profession in the face of increasing competition from other medical and science career opportunities, it is vital that we commit ourselves to the promotion and awareness of pathology, and continue to train our young professionals to the very highest standards.

This public engagement programme will require financial support from the College for years to come and we hope very much that we can build on the tremendous support you have already given and ask if you would consider leaving a legacy.

Additions to your existing will can be made using a 'Form of codicil', available on our website. Alternatively, please write to us and we will be happy to post you a copy.

Please note that witnesses should be present when you sign the form, but it should not be witnessed by a College member or the spouse of a College member. We recommend consulting a solicitor or qualified will writer before making a will; they should give you all the legal and tax advice that you require.

If you are considering including a legacy to the College in your will, we would very much appreciate being informed of your generous act. To inform us of your bequest or for specific advice on legacies to the College, please contact me.

Daniel Ross
Chief Executive (daniel.ross@rcpath.org)

↑ RETURN TO CONTENTS

College conferences

Medical Examiner (ME) training session - Virtual Training

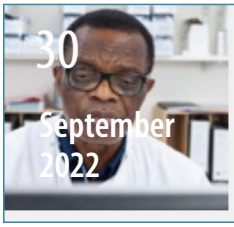
6 CPD CREDITS COLLEGE CONFERENCE

Medical Examiner Officer Training – Virtual Training

6 CPD CREDITS COLLEGE CONFERENCE

Not in the textbooks study day – virtual meeting

6 CPD CREDITS COLLEGE CONFERENCE



RCPATH workshop: CNS tumour WHO 2021 and methylation profiling – update recommendations

LONDON - NORTH, CENTRAL AND EAST LONDON 7 CPD CREDITS

COLLEGE CONFERENCE

Medical Examiner (ME) face to face training session - IN PERSON

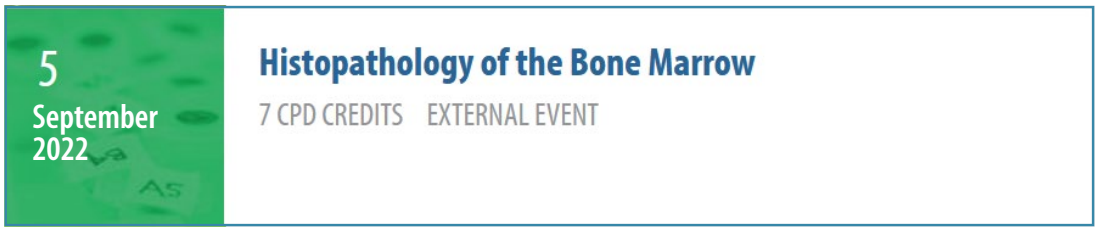
LONDON - NORTH, CENTRAL AND EAST LONDON 6 CPD CREDITS

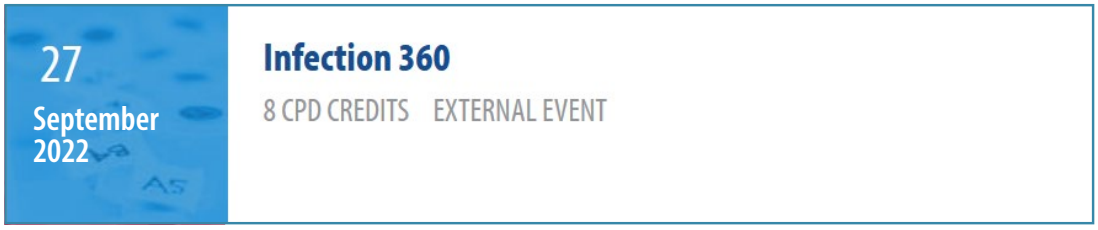
COLLEGE CONFERENCE

RETURN TO CONTENTS

To see all 2022 conferences visit our website.

2022 CPD-accredited events





RCPath CPD-accredited online resources can be found here.

British Division of the International Academy of Pathology

Promoting pathology through education and research

Dates for your diary

BDIAP Symposium on Upper GI Pathology

18–19 November 2022

London, UK

Further information available online

All future meetings can be found on the BDIAP events calendar
https://bdiap.org/events

RETURN TO CONTENTS

Pathological Society of Great Britain and Ireland

Pathological Society
Understanding Disease — Guiding Therapy

The Pathological Society of Great Britain and Ireland offers a wide range of grant schemes.

EDUCATION GRANTS/COMPETITION	
Bursaries for undergraduate elective or vacation studies (available to Associate Undergraduate Members of the Society)	27 February & 28 April
Education Grant	1 April & 1 October
Intercalated Degree (available to Associate Undergraduate Members of the Society)	31 March & 1 October
Student Society Bursary Scheme (available to Associate Undergraduate Members of the Society)	Open
Undergraduate Essay Competition (available to Associate Undergraduate Members of the Society)	31 August
Jean Shanks/Pathological Society Summer Studentships	Open
RESEARCH GRANTS	
Best Trainee Research Impact Award	1 October
Best Trainee Research Paper Award	1 October
Consultant's Pump-Priming Small Grants Scheme	1 April & 1 October
CRUK/Pathological Society Predoctoral Research Bursary	25 March & September TBC
Cuthbert Dukes Grant	1 April
Early Career Pathology Research Grant – Hodgkin & Leishmann	1 April & 1 October
Equipment Scheme	1 April & 1 October
International Collaborative Award	1 October
PhD Studentship	1 October
Post-Doctoral Collaborative Small Grant	1 April & 1 October
Trainees Collaborative Small Grant	1 April & 1 October
Trainees-Clinical Scientist Partnership Grant Funding Scheme	1 October
Trainees' Small Grants Scheme	1 April & 1 October
Visiting Fellowships	1 April & 1 October
TRAVEL GRANTS	
Pathological Society Meetings Bursaries	31 May & 31 December
Pathological Society Meeting Bursaries for Undergraduates	31 May & 31 December
Travel & Conference Bursaries	Open
JEAN SHANKS/PATHOLOGICAL SOCIETY (JSPS) RESEARCH GRANTS	
Clinical Academic Research Partnership (CARP)	1 April & 1 October
Clinical Lecturer Grant	1 April & 1 October
Clinical Lecturer Support Grant	1 April & 1 October
Clinical PhD Fellowship	1 April & 1 October
Intermediate Research Fellowship	1 April & 1 October
Pre-Doctoral Research Bursary	1 April & 1 October
OTHER GRANTS	
Open Scheme	1 March, 1 June, 1 September & 1 December
Public Engagement	1 March, 1 June, 1 September & 1 December

Full details are available on our website: www.pathsoc.org or from:
Lydia Ivnik, Pathological Society of Great Britain and Ireland. E: operationsmgr@pathsoc.org
5th Joint Winter Meeting of the Pathological Society & The Royal Society of Medicine
31 January–2 February 2023

Events @ No 6 are delighted to offer a range of services to members of the Royal College of Pathologists. We are an integral part of the team at 6 Alie Street, providing a bespoke catering, event management and reception services.

Members and associates of the College are provided with an **exclusive 20% discount** on venue hire bookings. We would be pleased to discuss how we can provide for your personal and professional meetings and events.

The state of the art facilities provide an ideal environment for meetings with room capacity ranging up to 210 for lectures with ample break-out space for larger conferences. The six different function rooms also mean that any style of event can be held at 6 Alie Street to suit your requirements, whether it's an academic webinar, team away day, filming, fine dining, private celebrations or special events.

Visit **www.eventsatno6.com** for more information or to arrange a show round please contact our dedicated events team on **020 7451 6705** or **email sales@eventsatno6.com.**

We look forward to welcoming you to Events @ No 6.