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of the Royal College of Pathologists

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In this issue

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

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

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On the cover: A lab technician undertaking blood typing, which is especially important in pregnant women to confirm Rh status.

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EDITORIALS

From the Editor

Dr Shubha Allard

Welcome to the July *Bulletin*. The weather and attempts at holiday plans or travel seem to be taking us on wide swings ranging from great optimism to the lows of ongoing uncertainty. A timely reminder that we can take very little for granted.

Nothing indeed should be taken for granted when considering the theme covered in this issue – namely maternal and child health. Bill Kirkup, working as an independent investigator with several years of experience, summarises lessons learnt from well-publicised failures of care in UK maternity services (pp 380–381). He indicates that better scrutiny of all unexpected perinatal deaths and expansion of medical examiner input could help identify poorly performing services with scope for corrective action before scandals occur. His concerns were mirrored in the recent report on maternity services in England, produced by the Health and Social Care Committee.

The report from the Health Safety Investigation Branch (HSIB) highlights opportunities for learning from maternal death investigations during the first wave of the COVID-19 pandemic (pp 386–389). Patient safety concerns were noted not just from the disease itself, but from behaviour changes in patient and staff appreciation of risk with resultant changes in patient pathways and access to services.

The importance of placental pathology is also emphasised in helping HSIB investigations in giving families an explanation when faced with adverse outcomes and planning care for future pregnancies where there is risk of recurrence. Moreover, ongoing scrutiny and learning from events are the hallmarks of the successful UK-wide SHOT haemovigilance scheme (pp 392–395), with a need to stay alert to old and new challenges towards prevention of haemolytic disease of the fetus and newborn.

Postpartum haemorrhage remains an important global cause of maternal morbidity and mortality and it is encouraging to see large trials, despite difficulties, in this challenging setting (pp 384–386). Maternal anaemia is a significant public health issue affecting more than a third of pregnant women worldwide with serious potential consequences for mothers and babies. Expert authors report on their experience from the UK (pp 395–397) and also on the specific challenges faced in sub-Saharan Africa (pp 398–400).

Developments within paediatric laboratory medicine have helped focus on the specific medical needs of children, however, issues around workforce and training for the pathologists involved need to be addressed (pp 382–383). Inherited disorders are a significant cause of death in childhood or result in disability or hospitalisation. It is gratifying to see that the UK now has an exceptionally well-regulated system for neonatal screening of over 750,000 of infants each year with rapid turnaround of results (pp 389–392).

Our 'Small is beautiful' article, fitting appropriately with items highlighted within the *Bulletin* theme, throws a spotlight on paediatric and perinatal pathology (pp 435–437). Although a relatively small specialty in terms of training and consultant posts, this is a wide-ranging subject with opportunities to become a 'super-specialist'.

COVID-19 continues to challenge health services with genomic testing helping to track the spread of emerging variants that threaten attempts to ease lockdowns around the world (pp 405–407). Highly successful vaccine programs have been adapted in the face of rare but fatal side effects (pp 407–409). The College has developed a series of short videos to address some of the most common myths circulating about the COVID vaccines, including targeting UK communities where English is not the first language (pp 411–412).

The pandemic continues to shape our approach to both teaching in medical schools (pp 428–429) and service delivery (pp 432–434), with the need for ongoing review and adaption. Active public engagement initiatives are proceeding virtually with successful book clubs (pp 412–413) and expert-led secondary school sessions on medical ethics around organ donation, genomic data and inherited disease (pp 413–414).

The incoming College International team also clearly recognises the ever-increasing need to work collaboratively in medicine and science to tackle challenges not contained by borders (pp 417–422). The members outline their experience and background essential to achieving the objectives of the College's Pathology is global strategy, supporting training and high professional standards overseas with international colleagues forming at least 20% of our membership.

The subject theme for the October issue will be cancer, with significant backlogs of cases impacting on prompt screening, diagnosis and timely management. This topic will no doubt continue to raise ongoing challenges for us all.

Shubha Allard
***Bulletin* editor**

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From the President

Dr Mike Osborn

Hello and welcome to the July edition of the *Bulletin*. It has been a very busy period for our members and the College on many fronts since the last *Bulletin*.

Our work across the devolved nations

Following the elections in Scotland and Wales we are developing relationships with their recently re-elected governments. We are looking forward to working with them to ensure that our priorities for pathology services, outlined in our College manifestos, are met. We are writing to the new Minister for Health and Social Services in Wales, Eluned Morgan MS, and the new Cabinet Secretary for Health and Social Care in Scotland, Humza Yousaf MSP, to highlight the key areas on which we would like them to focus. We are showcasing the vital role pathologists play in research, advancing medicine and devising new treatments to fight viruses, infections and diseases.

In Northern Ireland, the Department of Health published *Elective Care Framework, Restart, Recovery and Design*. The Framework proposes a £700m investment over five years and plans to reduce the backlog of patients currently waiting for assessment and treatment. It commits to supporting the Pathology Network so Health and Social Care Pathology Services are equipped to support delivery across all relevant Rebuild programmes.

This is a good start towards tackling the backlog, and the progress of the regional pathology modernisation, combined with the digital pathology roll-out, will improve throughput. That said, we still have serious concerns over the backlog and the related surge of demand for pathology services, particularly for cancer diagnosis and treatment, both tissue and blood cancers. See more about our advocacy in the article from our Public Affairs Officer, Janine Aldridge, on page 415.

Northern Ireland and Wales symposia

The recent Northern Ireland and Wales symposia gave me the opportunity to discuss issues pertinent to those nations and virtually meet trainees. Such meetings help to inform our plans for how to champion the pathology needs of these nations. I was just disappointed I could not attend these beautiful areas in person, although I have been promised an 'Ulster Fry' in Northern Ireland next year and have agreed to walk a section of Offa's Dyke in Wales as part of the College 60th Jubilee celebrations next year.

Investing in the future of pathology services

I and members of the College have continued to make the case for investment in pathology services with politicians, policymakers and stakeholders. College Registrar, Dr Lance Sandle, and College Fellow, Dr Mohammad Raza, Consultant Virologist, attended a virtual roundtable meeting organised by the King's Fund on the role of point-of-care testing in preventing the spread of communicable disease and, in particular, respiratory disease.

Other members of the College have also had recent speaking engagements, for example, Professor Darren Treanor spoke at the Westminster Health Forum conference on the use of Artificial Intelligence in Healthcare, and Professor Sarah Coupland, College Vice President for Communications, spoke at a Westminster Health Forum event on the next steps for the use of genomics in healthcare.

I was delighted to present at the British Association of Gynaecological Pathologists on 'Pandemic tales', and at the Association for Clinical Biochemistry and Laboratory Medicine's UKMedLab21 event on Workforce Issues and Solutions for Cellular Pathology. I covered the core work of our pathology specialties during COVID-19, redeployment, lost training and the College's ongoing work with health education bodies and the NHS in England and the devolved nations to try to address these issues. I was also recently interviewed by *The Pathologist* discussing what it is like taking up the role of President in a pandemic, where I see pathology in 10 years' time and more.

The cancer backlog

Following a productive meeting with Elliot Colburn MP (Conservative, Carshalton and Wallington) and Macmillan Cancer earlier this year, we were very pleased to see Elliot Colburn MP write to the former Secretary of State for Health and Social Care Matt Hancock to highlight concerns over backlogs in cancer services.

Continuing with the College's lobbying activities in this area, I spoke at the #CatchUpWithCancer roundtable discussion and cancer summit events hosted by the All Party Parliamentary Group for Radiotherapy, All Party Parliamentary Group on Cancer and All Party Parliamentary Group on Health. These events brought together experts from across the cancer healthcare community with parliamentarians to discuss and highlight the cancer backlog and the issues relating to reducing it, particularly around pathology and diagnostics. These discussions informed the *Catch Up With Cancer – The Way Forward* report, which made recommendations to the government. With 40,000 'missing' cancer patients and referrals down 350,000, urgent action is needed. Along with 70 MPs, heads of medical colleges and leading oncologists, I signed

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a letter addressed to the Prime Minister urging him to accept the recommendations from the summit and asking to meet with him to discuss the urgent response needed to tackle the COVID-19-induced cancer backlog.

Secretary of State for Health and Social Care

I have written to the new Secretary of State for Health and Social Care, Sajid Javid, offering my congratulations on his recent appointment. I outlined the College's serious concerns over preparations to deal with the backlog of cancer care, and other serious illnesses, and the surge of demand for pathology services as a result of the pandemic. We need increased investment in pathology services, particularly in the recruitment and training of pathologists and scientists. I have also requested a meeting to discuss these areas in more detail and invited the Secretary of State to visit a pathology laboratory to see first-hand the amazing work of our members.

Improving diagnostic pathways

The College was delighted to support a new report, *Crohn's and Colitis Care in the UK: The Hidden Cost and a Vision for Change*, published by the IBD UK alliance, of which we are a member. The report looks at issues in diagnosing Crohn's and colitis, and poor care after diagnosis – their findings show people wait too long for diagnosis and just 8% of inflammatory bowel disease services have enough histopathologists.

I was also very pleased to contribute to the National Institute for Health and Care Excellence (NICE) impact report on diagnostic pathology. Focusing on NICE guidance where uptake data was available, the report covers how NICE identify and support adoption of new diagnostics, uptake of NICE-recommended pathology diagnostics and diagnostic pathology during the COVID-19 pandemic. This guidance was produced using evidence provided by our members and gives us a useful NICE-recognised benchmark against which to highlight pathology issues going forward.

Lobbying for additional training posts

The College continues to highlight the issues facing our profession and our activities and discussions with policy makers and stakeholders are bearing fruit. After years of lobbying, Health Education England (HEE) has put funding towards an additional 35 histopathology training posts in England, with the aim of the posts being recruited to in the current recruitment round. They will increase the current annual intake of histopathology training posts by about a third.

HEE has also allocated an additional four haematology training posts. These new posts will go some small way to alleviate the workload issues in these specialties, although it will take many years before these posts translate into working consultants. There is still a huge amount of work to be done in these and all our specialties in terms of addressing staffing and other service issues, but it's a start.

The medical examiner and coroner services

We were very pleased to receive a letter from Nadine Dorries MP, Minister of State for Mental Health, Suicide Prevention and Patient Safety, thanking the College for hosting the Medical Examiner (ME) Conference in April. She recognised our support in the implementation and roll out of the ME system, including the delivery of the ME training programme and the ME committee. As the lead medical royal college for MEs, we welcome the roll out of the ME system to cover deaths in non-acute and community settings. It is another important step towards creating a world-leading system of death investigation and patient safety improvement, with every death in England and Wales that is not reported to a coroner being scrutinised by an independent ME. Crucially, it will also give all bereaved families the opportunity to ask questions or raise concerns about the care of a loved one. The College has trained over 1,500 ME and ME officers, and expects to train many more over the coming months.

The College also welcomed the report from the House of Commons Justice Select Committee on the Coroner Service. The report follows on from evidence that I and others gave to the Justice Committee in September 2020. I spoke alongside the Coroners' Society and the Chief Coroner highlighting the shortage of pathologists to carry out post mortems. We are pleased that the report contains a number of recommendations to address the shortage of pathology services, including the call for an immediate review of and increase in Coroner Service fees for pathologists.

Supporting the implementation of College guidelines

The College has introduced an exciting new member benefit in response to a survey about how our clinical guidelines are being used and how we can support their implementation. Created by the Clinical Effectiveness team and the Working Group on Cancer Services, with the help of many members, this webinar programme is led by guideline authors to provide support in implementing new or revised clinical guidelines. The first webinars in the online learning programme were hugely popular. Please see our website for more information about future webinars.

Volunteering for the College

Many of our activities depend on our members volunteering to become involved in College and without these roles the College could not function.

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We thank you all for your help and hard work. We celebrate our volunteers each year during Volunteers week and this year we profiled three colleagues who contribute to College work. From a specialty advisor role on a College committee, to being a College examiner, to joining the Pathology Portal editorial board, there are many ways you can become involved in helping to shape and guide our work. Whoever you are, whatever your field of work, wherever you work, there's a role for you at the College.

We also have lay representative volunteers who form the College's Lay Advisory Group, helping to support members in delivering excellent patient care. We now have a new Lay Trustee Board Member, Vince Voon, who is already providing active input into College activities. We welcome Vince to the College. I asked Vince for his thoughts a couple of months on from his appointment and he shared the following:

'I joined RCPath as a Lay Trustee in May 2021 and it has been a pretty immersive experience so far. I've also had various introductory calls that have been very helpful in understanding the workings of RCPath. Everyone has been incredibly welcoming to such an extent that I feel I will suffer from some level of 'imposter syndrome' but hopefully, will be able to genuinely contribute to the great work being done!

On the subject of great initiatives, I have been hearing about the work on diversity and inclusion (D&I) and am really impressed as to how important it matters to the Trustees and the Council. I won't steal the thunder from the D&I Advisory Group on their forthcoming initiatives but just wanted to share a few initial thoughts.

My personal view is that as D&I features more and more on the strategic agenda, we need to focus on the specific issues we wish to solve – whether it's challenges in career progression, having a more representative workforce, members' training or having more positive role models.

There's also something about becoming more of a 'listening organisation', how we embed this in our culture and how we hear (and learn) from staff and members' experiences. A cultural narrative that visibly demonstrates that we are listening and addressing these issues.

Thank you for the warm welcomes from everyone I've connected with and I look forward to meeting more of you in the months to come.'

The College's Strategy 2021–2024

The College's three-year strategy has recently been published and our key strategic aims include delivering high-quality member services; developing and maintaining high standards of education, training and research; promoting excellence and advancing knowledge in pathology; increasing the College's influence through a clear, coherent, professional voice; and resourcing the future development of the College. These are the areas we plan to focus on and, through this focus, we will build on the previous successes of the College and ensure everyone feels we work to help and support them. Further details of the College's strategy are available on our website.

Congratulations

The spring exams are now over and I would like to congratulate all those who have passed their RCPath exams in this recent session. This is a major achievement, especially in the context of the challenges presented by the pandemic. Our thanks and appreciation must also go to our amazing examiners and the fantastic College Exams team who, together, have successfully delivered another round of examinations, many of them online in very difficult circumstances. We have learnt a huge amount about running online exams during the pandemic and have been working hard with our trainee representatives and other members to plan how best to develop and run our exams in future. We expect most Part 1 exams will be online while most of our other exams and vivas will be in person (circumstances permitting). In this way, we can maximise our resources and make exams as COVID-19 proof and as stress free as possible for all involved.

Finally, on 12 June it was our patron Her Majesty the Queen's birthday and College members were among those named in the Queen's Birthday Honours alongside other colleagues working in health, medicine and science. These are awarded to recognise the outstanding achievements of people across the UK and it is fantastic to see the vital work of our members recognised. This includes those whose work made a crucial difference to the impact of the pandemic, but in many other areas as well.

College members were awarded the following honours: Dr Jonathan Paul Sheffield awarded Commander of the Order of the British Empire for services to medical research particularly during the COVID-19 response; Professor Marie Ann Scully awarded Order of the British Empire for services to blood disorders; and Professor Anthony Walter Rowbottom awarded Order of the British Empire for services to pathology during the COVID-19 pandemic. I would like to offer my congratulations and to thank them for all their work during such a challenging and difficult time.

Thank you all for your continued support to the College. I wish you a sunny, happy summer.

Dr Mike Osborn MRCS FRCPath
President
The Royal College of Pathologists

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MATERNAL AND CHILD HEALTH

Bill Kirkup

Perinatal mortality – are we learning?

Following on from high-profile failures of care in some UK maternity services, the Department of Health and independent investigators seek to better identify issues, improve maternal health and reduce neonatal deaths.

2015 saw the start of a new focus on maternity services, initially precipitated by the publication of a report into systemic failures of care in Morecambe Bay.[1] Significant harm to babies and mothers caused public concern; within a few months, the Department of Health (DH) had published its ambition to halve stillbirths and neonatal deaths by 2030,[2] and commissioned a national review of maternity services, which published its report, *Better Births*, the following year.[3]

New policies resulting in improvement

Over the succeeding five years, policy initiatives were introduced to promote change. *Saving Babies' Lives* from NHS England identified measures to improve maternity safety,[4] the Royal College of Obstetricians and Gynaecologists introduced *Each Baby Counts*, an audit of maternity outcomes,[5] a Maternity Transformation Programme was established to implement the recommendations of *Better Births*, and DH published two follow-up progress reports under the title of *Safer Maternity Care*.[2,6]

These changes have been credited with contributing to improvements in perinatal mortality.[7] Stillbirths have decreased by 25% (per thousand total births) since 2010, roughly on track to meet the national ambition. Neonatal deaths have followed a more complex pattern, with an initial rise associated with more very early births being classified as neonatal deaths instead of miscarriages as previously, but neonatal deaths in babies born over 24 weeks have decreased by 10% (per thousand live births).[7] There is more to do to achieve the national ambition, but both elements of perinatal mortality are improving overall.

Further cause for concern

This is, however, far from the complete picture. Despite the overall improvements, there have been further alarming failures of individual maternity units, most notably in Shrewsbury and Telford,[8] and an independent investigation has been commissioned into East Kent maternity services.[9] Given that the prompt for the initiatives to improve maternity services was a failing maternity unit in Morecambe Bay, this is a significant concern. Many of the findings of the interim Shrewsbury and Telford investigation report are very reminiscent of the failings described five years previously at Morecambe Bay.

The performance of clinical units follows an approximately normal distribution,[10] with most grouped centrally around the mean and smaller numbers in each tail, either outstandingly good or bad. It seems highly likely that the improvements in maternity outcomes have been achieved through changes in the central majority, but this has not affected those units in the poorly performing tail, at least to the same extent. It may be that the policies are not well adapted to those units, or perhaps they are unwilling or unable to follow suit. There has been no discernible decline in the occurrence of maternity scandals despite the overall improvement in services.

More changes needed

Effective early warning system

To change this depressing situation, the first requirement is to have early warning of which units are at risk. It is evident, however, that the earliest warning of most poorly performing units comes from families who have been harmed by failures of care.[1,8] It is further evident that in many of the most egregious instances those families have not been listened to initially, but have been fobbed off, ignored and misled, and have required great persistence and courage before their voices have belatedly been heeded. It seems that for some units, reputation management still has a higher priority than openness and honesty when something has gone wrong.

It is unlikely that high-level statistics, such as perinatal mortality, can provide an effective early warning of such units because appreciable numbers of avoidable adverse outcomes are easily swamped by higher numbers that were inevitable. Although more sensitive indicators are available, such as intrapartum stillbirth, unexpected early neonatal death and brain injury, the analysis of unit-based outcomes for maternity care is still rudimentary compared with other specialties.[10]

Further, self-reporting and external inspections are rarely helpful in identifying poor unit performance. Recurring features found in independent investigations include dysfunctional teamwork, closed organisational cultures and poor leadership, resulting in lack of recognition, reporting and investigation of incidents and failure to learn from them.[1,8] This underpins the rejection of families who want answers to why harm has occurred, but it also makes external recognition of seriously dysfunctional organisational performance problematic, whether by NHS England or the Care Quality Commission.

Each Baby Counts

There is an obvious source of information, very relevant to poorly performing units but, because of their nature, it is particularly likely to be suppressed: the deaths of babies otherwise expected to survive. 'Babies born at 37 weeks and who are alive in labour (without significant congenital anomaly) should be born in good condition and go home with mum and family.'[5] The corollary is that any death of such a baby should generate full investigation to find out why and what should change to prevent recurrence. A high proportion will be found in which different clinical care could have led to a different outcome – 74% in the RCOG's *Each Baby Counts* audit[5] – and intrapartum stillbirths are particularly likely to be preventable.[11]

In a well-run unit, of course, disclosure and investigation are exactly what happens, but reports into poorly performing maternity services consistently find a different pattern. Unexpected deaths may at best be poorly investigated with no learning or, at worst, not even reported as safety incidents. They are, in effect, written off as inevitable because, in the words of one clinician, 'bad things happen in maternity – people just have to accept it'.[1] It may seem surprising that the death of a healthy individual expected to survive can be brushed aside so easily, but the fact is that the safeguards that would prevent it in an adult or older child are lacking for perinatal infants.

More investigation needed after stillbirth and early death

Many of these babies are stillborn, so formally regarded as having had no separate existence; coroners have no remit to require an investigation or jurisdiction to hold an inquest. Not only does this mean that there is no backstop to ensure that these deaths are properly investigated, it also generates an incentive to record early neonatal deaths as stillbirths. Yet in non-malformed term babies, the great majority of causes of intrapartum stillbirth are the same as the causes of early neonatal death, with hypoxia and brain injury predominating. The pulmonary and cardiovascular changes that occur immediately after birth, while physiologically profound, do not change the pathology of the term neonate without congenital anomaly. The concept of no separate existence prior to the first breath remains legalistic, not pathophysiological.

Those babies born alive after severe hypoxia in labour who subsequently die of the effects may not attract the attention of coroners either. Most will have been through a full gamut of resuscitative and interventional procedures by one or more neonatal teams, and by the time that active treatment is abandoned the outcome will commonly be regarded as an expected death. So it was, from the perspective of the neonatal teams, but it was entirely unexpected from the perspective of a term baby without congenital anomaly, and it should be investigated as such. However, poorly performing units typically show little enthusiasm for drawing the coroner's attention to the prior events.

Independent scrutiny and scope for expansion of medical examiner input

The introduction of medical examiners offers a clear opportunity to ensure that these cases are not lost and can be learned from and, where necessary, instances of systemic failure can be identified. To achieve this, medical examiners will need to retain sufficient independence and remain aware that deaths that appear inevitable after a fraught neonatal course may have been entirely avoidable if the management of labour and delivery had been different. Further, stillbirths are not currently within the remit of medical examiners, an inexplicable omission despite previous recommendation. The scope of medical examiners should include at least the stillbirth of all non-malformed babies born at 37 weeks gestation or more.

Better independent scrutiny of all unexpected perinatal deaths would be a very significant step forward, helping to identify poorly performing services before they cause scandals and contributing to the national ambition to improve maternity safety.

References available on our website.

Bill Kirkup
Independent Investigator

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Dr Charles van Heyningen

The evolution of paediatric laboratory medicine

Over the last few decades, paediatric laboratory medicine has developed with an increasing focus on the specific medical needs of children, creating new opportunities for workforce and training development for pathologists.

For most of the 20th century, laboratory investigations for children were usually undertaken as part of a service for patients of all ages. There was limited appreciation of the differences between results for adults and those for children. What might be a concerningly high serum alkaline phosphatase activity for an adult, for instance, would have been a normal result for a growing child but, without including age-related reference ranges, the report may not have conveyed this information.

Some of the earliest books to describe paediatric reference intervals were published in the 1980s by Blackwell Scientific Publications and by the American Association for Clinical Chemistry.[1,2] From then on, we have become increasingly aware of the many differences between younger and older populations. In fact, an experienced chemical pathologist suggests that the greatest advances in paediatric biochemistry over the last 40 years have been in newborn screening (for further information see *Successes and challenges in newborn screening for metabolic disorders* on page 389) and more accurate paediatric reference intervals.[3]

Further development of paediatric laboratory medicine

The authors of a 2002 review concluded that the practice of paediatric laboratory medicine (PLM) involves unique challenges related to development, nutrition, growth and diseases during different periods of infancy, childhood and adolescence.[4] They proposed that subspecialty paediatric laboratory testing offers many opportunities for improved paediatric patient care, research and education, and that it is best practiced with close collaboration between pathologists and clinicians. They described the many challenges involved, including the need to deal with small sample volumes and the need for reference centre provision of esoteric tests.

An editorial in 2009 described a worldwide PLM network.[5] The opinion was expressed that children cannot just be regarded as small adults, a fundamental approach that holds for diagnostic services for the management of sick children.

In 2017, leading international specialists in the field reflected on reasons for developing a PLM subspecialty distinct from adult pathology and laboratory medicine.[6] In many countries, young patients are treated in children's hospitals. The blood volumes available for testing are lower than those for adults, and urine collection can be problematic, which are issues that make microanalysis especially useful. The test menu is different for children, too, particularly regarding the diagnosis of inborn errors of metabolism and follow-up of newborn screening. A good network of reference laboratories is needed to evaluate rare diseases present in childhood. All these considerations favour the provision of specialist paediatric clinical laboratory support for the management of childhood disease.

The International Federation of Clinical Chemistry Task Force on Paediatric Laboratory Medicine was established in 2006 as the successor to the International Association of Paediatric Laboratory Medicine. The task force has several aims as follows:

- to coordinate the establishment of worldwide reference ranges for laboratory test results in paediatric patients of all age groups
- to form a sound support basis for the continuation of the successful International Congresses of Paediatric Laboratory Medicine
- to create a worldwide network of scientists working in laboratories that specialise in paediatric medicine.

In keeping with this mission, the congresses focus on scientific and technological achievements in all areas of paediatric clinical and diagnostic laboratory medicine. The most recent one in South Africa was the most successful yet,[7] and the next real or virtual meeting planned for November 2021 in Germany will tackle emerging technologies.

To address the challenges and issues specific to PLM, specialists in the UK formed a new national collaborative network in 2014 – the Paediatric Laboratory Medicine Network (PaLMnet). The network aims to provide expertise and advice on the best laboratory techniques for use in both paediatric specialist and non-specialist clinical laboratories alike. It is already making a difference; a recent audit of sweat testing in the UK was carried out and, from the evidence obtained, recommendations on sample collection were made. Further differences have been recognised between paediatric and adult laboratory medicine, such as different typical presentations, test repertoires and priorities, and the higher proportion of abnormal results in children. Testing may require greater urgency and different critical action limits.

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Researchers in the department of paediatric laboratory medicine at SickKids, Toronto, Canada, working towards reducing the impact of childhood illness.

Workforce and training challenges

In the UK, many experienced scientists work in paediatric biochemistry laboratories, but it is difficult to recruit new staff with suitable specialty experience. Discussions have started on establishing paediatric metabolic training with a curriculum and funding. But these advances are not exclusive to the UK; we now have good evidence that several of the initiatives to establish this specialty elsewhere have been successful. The first edition of a textbook entitled *Pediatric Laboratory Medicine* was published in 2017 and is intended as a resource for basic PLM training.[8] It discusses the unique characteristics of paediatric practice and covers a range of biochemical aspects, as well as molecular diagnostics, microbiology and haematology for children.

The UK metabolic biochemistry network, MetBioNet, is a good example of what we can achieve through collaboration and networking.[9] Its participants have developed a range of useful resources, delivered analytical quality improvements and are addressing training and educational needs. By engaging with other strategic groups, such as the national newborn screening and inherited metabolic disease groups, MetBioNet has helped to influence the provision of children's laboratory services in the UK.

Current paediatric pathology training in the UK focuses on histopathology. I believe that it would be valuable to have full specialty recognition by one or more professional regulators and a curriculum, courses and a recognised qualification to cover laboratory blood sciences for children, especially for clinical biochemistry, haematology and immunology. Qualified specialists might run clinics for inborn errors of metabolism or lipid disorders for both children and young adults to provide continuity of care.

Because of the many important differences between children and adults, PLM is rapidly becoming a pathology specialty in its own right. The scope of knowledge typically covers the paediatric aspects of various non-histopathology disciplines, mainly clinical biochemistry, metabolic medicine, toxicology, haematology, blood transfusion, immunology, genetics, microbiology and virology. This evolving focus is likely to result in better medical care for the children of the future.

References are available on our website.

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Dr Charles van Heyningen
Clinical Biochemistry Representative
Specialty Advisory Committee for Paediatric Pathology

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Major obstetric haemorrhage – achievements and ongoing challenges

Josephine McCullagh

Dr Laura Green

Josephine McCullagh and Dr Laura Green explore the possible treatments for postpartum haemorrhage, from blood transfusion to haemostatic drugs.

Excessive bleeding within the first 24 hours after childbirth, known as primary postpartum haemorrhage (PPH), remains the leading cause of maternal death in developing countries.[1] In the UK, the risk of death from PPH is low (about one in 100,000 deliveries),[2] however women who survive severe PPH suffer more long-term morbidities compared with other types of obstetric complications.[3]

There is no universally accepted definition for PPH. The World Health Organization defines PPH as a blood loss of ≥500 ml within 24 hours after birth, whereas the Royal College of Obstetricians and Gynaecologists classifies PPH into minor (500–1,000 ml) and major (>1,000 ml), with the latter being subdivided into moderate (1,000–2,000 ml) and severe (>2,000 ml).[4] Over the last decade, the incidence of PPH has risen in developed countries (UK included) owing to increasing maternal age at time of delivery, multiple births, obesity and increased obstetric interventions such as caesarean section (Figure 1).[5]

The treatment for primary PPH requires a multidisciplinary approach. Interventions like uterotonic agents, surgical and radiological interventions, and haematological treatment are essential for controlling bleeding. In this article, we will briefly summarise some of the achievements from recent years on the haemostatic and transfusion management of PPH and highlight some ongoing challenges.

Transfusion management

Transfusion of blood components with red blood cells, plasma and platelets is an essential part of resuscitation of bleeding patients, with initial empirical use of these components being delivered as part of major haemorrhage protocols. These protocols allow for the delivery of blood components in fixed ratios, aiming to correct coagulopathy early and allow for the rapid issuing of blood through better communication between laboratory and clinical teams.[6] However, we don't know if ratio-driven transfusion in PPH improves outcomes, owing to the lack of randomised control trials (RCTs). Further, there is concern that this approach may expose women to unnecessary transfusion, particularly plasma. Conventional laboratory-based clotting tests have slow turnaround times and point-of-care testing such as viscoelastic haemostatic assays (VHA) are now being used to guide targeted transfusion in PPH. The two most used devices are thromboelastography and rotational thromboelastometry, both utilising whole blood samples to assess coagulation and fibrinolysis. Currently, there is limited evidence supporting their use in guiding transfusion in PPH, as highlighted by two systematic reviews.[7,8] In addition to the need for evaluating its cost-effectiveness, it is also important that VHA protocols are standardised prior to widespread application in routine practice.

Haemostatic drugs

Tranexamic acid

An antifibrinolytic agent that competitively inhibits plasminogen activation, tranexamic acid (TXA) is used widely to reduce blood loss by preventing clot breakdown (fibrinolysis). The benefits of TXA in PPH was demonstrated in the WOMAN trial, which was an international, double-blind, placebo-controlled study that randomised 20,060 women with PPH to intravenous TXA versus placebo in addition to usual care.[9] Its results showed that TXA reduced the risk of death from exsanguination (RR: 0.81; 95% CI: 0.65–1.0; p = 0.045), with the treatment benefit being the strongest when TXA was administered within three hours of birth. Based on these results, TXA should be adapted into routine clinical practice and be given to all women with PPH.

Fibrinogen concentrate

Fibrinogen levels fall early in PPH and a low level of fibrinogen (<2 g/l) is an independent predictor of morbidity for women.[10] The timing of when to replace fibrinogen in PPH remains unknown. A systematic review that evaluated the early use of fibrinogen replacement therapy in PPH identified two small RCTs (total of 299 women) that compared fibrinogen concentrate (FgC) with placebo on overall transfusion and both trials showed no benefits with FgC.[11] Another similar RCT recently showed that FgC (versus placebo) did not reduce blood loss or transfusion needs in PPH.[12] In all these trials FgC was administered when fibrinogen levels were >2 g/l, which might explain why there was no benefit with FgC.

There have been no studies on the use of cryoprecipitate in PPH, despite the component being the main source of fibrinogen replacement in many countries. The systematic review identified only one ongoing pilot cluster RCT assessing the feasibility

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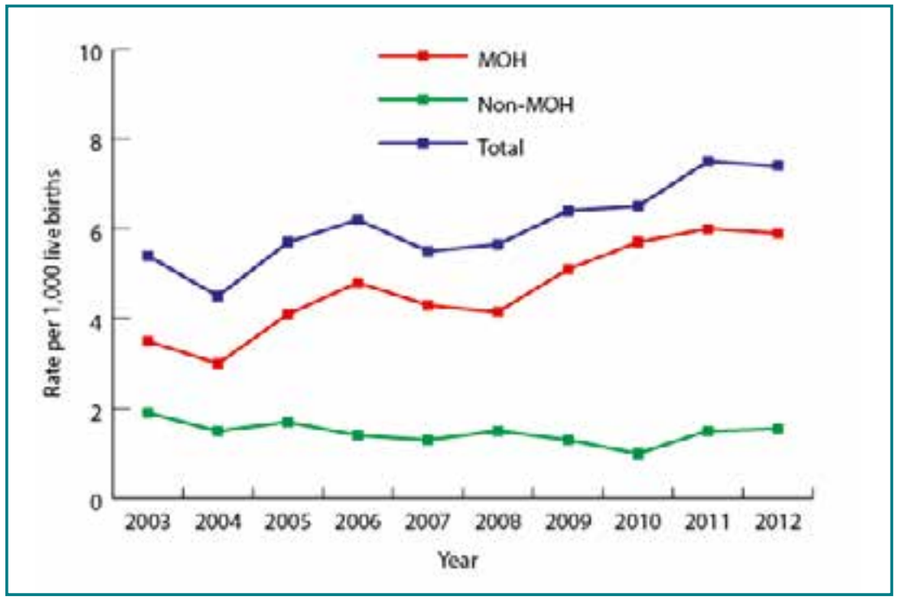
Figure 1: Rates of women with major obstetric haemorrhage and other morbidities 2003–2012.[3]



of administering cryoprecipitate early versus providing standard care to women with more severe PPH who require blood transfusion.[13] There is a need to evaluate the role of cryoprecipitate in PPH, as well as compare cryoprecipitate versus FgC in PPH, particularly as the former contains additional factors like factor XIII, fibronectin, von Willebrand factor antigen and factor VIII, in addition to fibrinogen.

Recombinant activated factor VII

Licensed worldwide, recombinant activated factor VII (rFVIIa) is used in haemophilia A and B patients who have inhibitory antibodies against factor VIII or factor IX. Its use for management of PPH has mainly been through case report studies. In 2015, the first multicentre RCT compared the use of FVIIa versus standard care in 84 women with severe PPH who were unresponsive to uterotonics treatment. Results showed that rFVIIa reduced the need for specific second-line interventions such as interventional haemostatic procedures for blood loss and transfusions.[14] However, this was a small study and not a placebo-controlled, double-blind trial. Large trials are needed to establish the safety and efficacy of rFVIIa for management of PPH.

Alternatives to blood transfusion

Cell salvage

To date, the largest multicentre RCT that has compared the efficacy and safety of cell salvage with no cell salvage is the SALVO study, which used cell salvage during caesarean section for women at risk of haemorrhage. The use of cell salvage in this trial showed a modest effect on overall transfusion rates (primary outcome) versus no cell salvage (2.5% vs 3.5%; 95% CI: 0.42–1.01; p = 0.056), and higher fetal maternal haemorrhage in RhD-negative women who delivered RhD-positive babies (25.6% vs 10.5%; p = 0.013).[15] The additional cost of routine cell salvage use during caesarean was estimated, on average, to be £8,110 per donor blood transfusion avoided. Based on the findings of this trial, the authors concluded that cell salvage is unlikely to be considered cost-effective.[15]

Future research

Given the difficulties of undertaking large trials in a challenging environment, it is encouraging to see the increasing interest in haematological management of PPH with key achievements around better understanding of the role of TXA and the cost-effectiveness of cell salvage in this setting. Future research in haematological management of PPH should focus on determining: the optimum ratio of blood components; if a VHA-guide transfusion approach is better than a ratio-driven transfusion; the efficacy and safety of FgC versus cryoprecipitate; and the role of rFVIIa.

References available on our website.

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Healthcare Safety Investigation Branch

Chandrima Biswas

Louise M Page

Patient safety is one of the highest priorities for the NHS. Read on to discover how the NHS investigates patient safety issues during pregnancy or childbirth.

The Healthcare Safety Investigation Branch (HSIB) conducts independent investigations of patient safety concerns in NHS-funded care across England. Our investigations identify the contributory factors that have led to harm or the potential for harm to patients. The safety recommendations we make aim to improve healthcare systems and processes to reduce risk and improve safety. We work closely with patients, families and healthcare staff affected by patient safety incidents, and we never attribute blame or liability.

We undertake patient safety investigations through the following two programmes.

National investigations

Concerns about patient safety in any area of NHS-funded healthcare in England can be referred to us by any person, group or organisation. We review these concerns against our investigation criteria to decide whether to conduct a national investigation. National investigation reports are published on our website and include safety recommendations for specific organisations.

Maternity investigations

We investigate incidents in NHS maternity services, including:

- babies born at term, after a woman has gone in labour with a live baby, who experience intrapartum stillbirth, early neonatal death or potential brain damage diagnosed in the first seven days of life
- our HSIB-defined criteria for maternal deaths.

Our investigation reports are shared with the family and trust, and the trust is responsible for carrying out any safety recommendations made in the report. In addition, we identify and examine recurring themes that arise from trust-level investigations to make safety recommendations to local and national organisations for system-level improvements in maternity services. For full information on our national and maternity investigations, please visit our website.

In this article, we describe two areas of our work – maternal death and placental pathology.

Maternal death: learning from maternal death investigations during the first wave of the COVID-19 pandemic

In March 2021, HSIB published a national learning report that reviewed findings from investigations into maternal deaths that met our criteria and occurred between 1 March 2020 and 31 May 2020.[1] 19 families gave their consent for their investigations to be included in the review. The causes of the women's death are shown in Figure 1.

Families are central to HSIB investigations. The families affected by the deaths of these 19 women identified four areas of concern.

Experience of maternal collapse at home

Circumstances where family members were asked to assist healthcare professionals at home – including assistance with resuscitation of their relative and with use of equipment – had a significant impact. Although there was a clear time-critical imperative for this, and it does occur outside the pandemic, HSIB investigations noted the impact such involvement had on family members.

Visiting restrictions

Changing policies that meant women were alone when attending hospital appointments, emergency departments, assessment units, ultrasound scans and on admission to hospital, including in maternity settings and intensive care units.

Families' ability to advocate or support

There were instances when families did not have the opportunity to visit the woman prior to her death. Visiting restrictions coupled with the sudden and, at times, unanticipated deterioration of the women's clinical condition added to the families' distress.

Families want to understand more about why their relative died

There were situations where families wanted to understand more about why their relative died and felt that information from a post-mortem examination (PME) would have helped. Nine of the women did not receive a PME, with the coroner deciding on cause of death based on other factors such as computed tomography scans or symptoms.

Themes of investigation

Seven themes emerged from HSIB's analysis of the investigations.

Unprecedented demand for telephone advice caused delays in accessing health care

Several women, or their family members, attempted to contact NHS services by telephone. These included NHS 111, GPs and maternity helplines. Families described experiencing significant delays, making repeated attempts and abandoning calls after waiting to connect with an operator.

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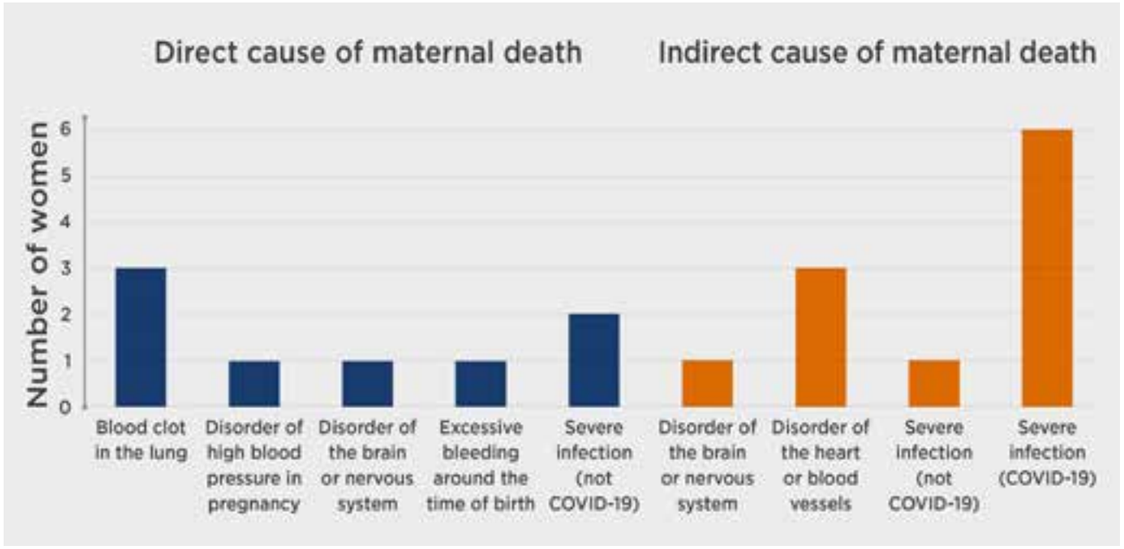

Figure 1: Causes of maternal death, separated into direct cause and indirect cause.

Public messaging and 'safety netting' advice caused delays in seeking healthcare

The message from the UK government during March to May 2020 was to 'Stay Home. Protect the NHS. Save Lives'.[2] HSIB investigations found that women and their families were concerned about their health, the risk of exposing their unborn baby to COVID-19 and the requirement to attend hospital without the support of their families. Because of these concerns they put off going to hospital for longer than they otherwise may have done.

Guidance changed rapidly

The effort to produce guidance to inform clinicians and the public about COVID-19 was unprecedented and the resultant wave of information being directed at staff on the frontline was considerable. It is evident from HSIB investigations that it was difficult for hospital trusts to keep staff apprised of updates to guidance.

Use of early warning scores did not always detect deterioration

HSIB investigations identified that early warning systems were not always used as intended. The issue of compliance in monitoring and recording clinical observations requires an understanding of working practices, and there are complexities in how scoring systems are embedded in practice. There is no nationally agreed maternity-specific early warning score in England, and investigations found examples where the National Early Warning Score (NEWS) 2 score, not designed for use in pregnant women, was used.

Personal protective equipment requirements changed due to COVID-19

The design of work processes and the environment did not adapt to account for the increase in time used to don personal protective equipment (PPE). Environments were described as 'noisy' with staff having to repeat requests and seek clarity of instructions. Clinicians' voices were 'muffled', and staff reported 'heightened stress levels' because of communication difficulties associated with wearing PPE.

Staff described feelings of stress and distress, which can affect performance

Stress was aggravated, for example by communication difficulties caused by PPE, redeployment to unfamiliar work areas and reduced staffing levels. The report highlights areas where organisational resilience may be increased.

Difficulties in making a diagnosis and choosing treatment strategies

Several investigations highlighted diagnostic challenges that may have resulted in missed or delayed diagnosis. Diagnosis was impeded by lack of communication and face-to-face assessment, access to tests and concerns about infection prevention and control, as well as complexity caused by rapidly acquired knowledge of a new disease and the physiology of pregnancy.

Safety recommendations

HSIB made safety observations about:

- the need to understand the increased risk of maternal death for women from black, Asian and minority ethnic backgrounds and those with higher socioeconomic deprivation

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- the use of the NHS England and NHS Improvement communications toolkit to improve communication with women from black, Asian and minority ethnic backgrounds in all healthcare services for pregnant women
- the development of written safety netting advice for pregnant and post-partum women about COVID-19 and other common conditions, incorporating the MBRRACE-UK (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK) recommendations.

HSIB also reiterated a previous safety recommendation made in a report on COVID-19 transmission in hospitals: 'It is recommended that the Department of Health and Social Care, working with NHS England and NHS Improvement, Public Health England, and other partners as appropriate, develops a transparent process to co-ordinate the development, dissemination and implementation of national guidance across the healthcare system to minimise the risk of nosocomial transmission of COVID-19.'[3]

The report concluded that HSIB investigations identified: patient safety risks arising from the disease itself or from behaviour changes relating to patient and staff appreciation of risk, changes in patient pathways and access to services, obstacles to care caused by additional safety precautions such as PPE, and reduced availability of staff. HSIB considers effective interventions are most likely to be successful at the system level.

HSIB has initiated national investigations in two areas identified from the review, namely the capacity of NHS 111 to respond to an unprecedented increase in demand and the detection of venous thromboembolic disease in pregnancy.

Placental pathology

Placental histopathology assessment is an important element of care for the babies that meet our referral criteria. HSIB recognises that around 40% of adverse events in babies are associated with placental vascular disorders;[4] placental histopathology may reduce the classification of 'unexplained' stillbirth from 30% down to 10%[5] and placental fetal vascular malperfusion is associated with the risk of neonatal encephalopathy.[6]

Placental pathology is important in helping HSIB investigations give families an explanation for the outcomes of their babies. It also assists in planning care in future pregnancies, as there may be a chance of recurrence.

Families value HSIB maternity investigations for their independence and explanation of events in simple language. One family gave the following feedback: 'We felt the process has helped us to better understand what happened and the report is written in a way that can be understood by someone who has no medical background'.

The RCPath recommends that placentas that are sent for full examination should include those 'from stillbirths, fetal growth restriction and cases of severe fetal distress requiring admission to a neonatal intensive care unit'.[7] HSIB acknowledges that, in some areas of England, placental pathology services are limited by a shortage of specialist placental pathologists, which influences the ability of a trust to meet this national recommendation.

HSIB has found that in around half of our investigations, the placenta was not sent for histopathological assessment. In more recent investigations, we observe that more placentas are being sent for examination, which HSIB believes reflects that trusts act on our findings and recommendations. A HSIB maternity investiga-tion noted: 'in combination with the other features seen in this placenta, it is likely that the delayed villous maturation caused longstanding lack of oxygen (chronic hypoxia) in the baby.'

Conclusion

HSIB is working across all healthcare settings to improve patient safety through effective and independent investigations that do not apportion blame.

Recent publications have included a thematic review of maternal deaths during the first wave of the COVID-19 pandemic; the themes identified are relevant to all areas of healthcare. Detailed analysis of maternal deaths is a relatively unique area of investigation – there are few other cohorts of individual deaths that undergo similar assessment.

HSIB's investigations have highlighted to trusts the importance of placental histopathology and are likely to be influencing improved uptake. HSIB is working jointly with the RCPath and NHS England to understand and overcome the barriers to wider implementation of the RCPath's *Tissue pathway for histopathological examination of the placenta*.[7]

References available on our website.

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Successes and challenges in newborn screening for metabolic disorders

Inherited disorders cause a significant fraction of disability, hospitalisation and death in newborns. From blood testing to mass spectrometry, the NHS seeks to continually improve screening for a wide variety of metabolic diseases.

Raphael Buttigieg

Dr Rebecca Stead

Background

Inherited metabolic disorders (IMDs) are a heterogenous group of disorders, each caused by deficient activity of a single enzyme in a pathway of intermediary metabolism. Interruption of different pathways can lead to accumulation of pathological/toxic products or a deficiency of products essential for health, causing systemic multiorgan damage and in most cases long-term physical or learning disability. It is estimated there are between 6,000 and 8,000 individual rare diseases. Although each individual disease is rare, the sheer number of individual rare diseases results in one in 17 of the population being affected.[1]

In 2019, genetic or heritable conditions are thought to have been responsible for:[2]

- 30% of deaths <1 year old
- 18% of deaths for ages 1–5 years old
- 11% of deaths for ages 5–15 years old
- 30% of all childhood admissions to hospital
- Two-thirds of all disability.

The UK newborn blood spot (NBS) screening programme started in the 1950s when phenylketonuria (PKU) was screened for using the Phenestix test, which was replaced with the dried bloodspot (DBS) system developed by Robert Guthrie in the late 1960s. The use of bloodspots on Guthrie cards is still in use to this day. In 1969, screening was centralised by the Department for Health and regional hub screening laboratories were established. Screening was devolved across regions, with marked variation in the scope of disorders until 1996 when the UK National Screening Committee (NSC) was launched. The NSC chose 20 criteria, based on adapted Wilson & Junger principles, against which screening for disease can be assessed.[3]

With the advent of tandem mass spectrometry (MS/MS or TMS) technology, screening for IMDs became faster, more sensitive and expandable. Mass spectrometry is a technique used for both identifying and quantifying compounds. Samples are ionised, the charged molecules are extracted into the analyser, separated by their mass-to-charge ratios and quantified by their relative intensity as they emerge. Newborn screening for IMDs uses an elute and shoot process that is rapid, relatively cheap and high throughput. This versatile method is advantageous as many analytes can be detected in a short time from very small quantities of sample. However, it has limitations as some metabolites are not always screened for a specific disease, and the technique cannot measure different compounds of the same molecular weight.

Currently, the UK NBS programme screens for six IMDs alongside three other disorders (congenital hypothyroidism, sickle disease and cystic fibrosis). A capital investment, in terms of tandem mass spectrometers, for medium chain acyl-CoA dehydrogenase deficiency (MCADD) screening took place in 2007. In 2008, screening was rolled out nationally after a two-year pilot study met the rigorous criteria set out by the NSC. PKU was also moved over to tandem MS/MS. This was followed by an ambitious pilot in 2012, covering a further five disorders, which could all easily be screened by existing MS/MS technology.

Of these five disorders, four were then included in the NBS bloodspot programme: isovaleric acidaemia (IVA), gluatric aciduria type 1 (GA1), homocystinuria (HCU) and maple syrup urine disease (MSUD). The addition of multiple other analytes represents a small incremental increase in cost, and screening for the four additional conditions is costsaving. The incremental net benefit for all four conditions, at a threshold of £25,000 per quality-adjusted life year, was between £0.46 for IVA and £5.94 for GA1.[4]

Comparing IMD screening in the UK to other countries

In the UK, all babies under a year of age are eligible for NBS screening for all nine conditions. Blood is collected via a heel prick test on day five of life and blotted onto a Guthrie card, which is sent to one of 13 laboratories with results released within a maximum of 72 hours upon receipt of the sample. Babies who screen positive are immediately referred to local clinical metabolic medicine teams and seen the same day for complete clinical assessment and confirmatory diagnostic testing alongside appropriate treatment. Families who have an affected child and go on to have further children are offered pre-implantation genetic diagnosis or, where they choose not to receive this specialist IVF treatment, the siblings of known cases are screened rapidly on day one of life for the known metabolic condition.

The USA has taken a very different approach to choosing conditions for newborn screening. Inherited disorders were individually assessed against

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Table 1: Comparison of screening in the UK versus the Netherlands.

Disorder	UK	Netherlands
	Cystic fibrosis	Cystic fibrosis
Haemoglobinopathies	Sickle cell disease Beta thalassemia major	Sickle cell disease Haemoglobin H disease (a form of alpha thalassemia) Beta thalassemia major
Endocrinology	Congenital hypothyroidism	Congenital hypothyroidism Congenital adrenal hyperplasia
Amino acid disorders	PKU MSUD HCU	PKU MSUD HCU Tyrosinemia type 1
Other metabolic disorders	IVA GA1	IVA GA1 3-Methylcrotonyl-CoA carboxylase deficiency Biotinidase deficiency Galactosemia HMG-CoA lyase deficiency 1
Fatty acid oxidation defect	MCADD	MCADD Multiple acyl-CoA dehydrogenase deficiency Very long-chain acyl-CoA dehydrogenase deficiency Carnitine transporter (OCTN2) deficiency 2

GA1: Glutaric acidemia type 1; HCU: Homocystinuria; IVA: Isovaleric acidemia; MCADD: Medium-chain acyl-CoA dehydrogenase deficiency; MSUD: Maple syrup urine disease; PKU: Phenylketonuria.

selection criteria, but also treated as a whole group. Some untreated conditions were included on grounds that screening 'might provide benefit to society' through reducing cost of diagnosis per condition and generating research benefit while maximising use of current technology.

29 core conditions were recommended by the American College of Medical Genetics (all of which have been adopted), and 25 optional secondary conditions that individual states can decide to include in their panels.[5] Owing to the complex healthcare system in the USA, although patients may be given a screening diagnosis, those without insurance may struggle to access appropriate healthcare for their condition and may be refused insurance throughout their life. Many of the conditions screened for in the US have no specific treatment yet. This approach may be of less benefit to individual families, who may then have to endure the knowledge of their child's often limited lifespan while being unable to benefit from further specific treatment.

Across Europe there are significant variations in screening protocols, with countries screening between one to 30 different conditions with unique inclusion criteria. An example of a screening protocol in the Netherlands compared with the UK can be seen in Table 1.

In the UK, the screening program has been well received, with only 2.8 in 1000 parents refusing screening.[6] The concerns of false positives causing undue stress and harm to families remains a challenge, particularly for IVA where maternal use of pivalate antibiotics causes artefactually elevated C5 carnitine. However, children correctly identified by screening benefit significantly through reduction in morbidity and mortality (see Figure 1).

Future directions for NBS

In 2019, the then Health Secretary, Matt Hancock, and Genomics England announced a pilot to allow parents to opt into having their newborn babies' whole genome sequence tested. This assesses the risk of developing health conditions over their lifespan. The assumption was that many lives would be saved knowing the risk of disease. However, large-scale studies in the USA have shown that the number of false negatives and false positives are greater than by the current method of MS/MS. Furthermore, as there is still uncertainty about the

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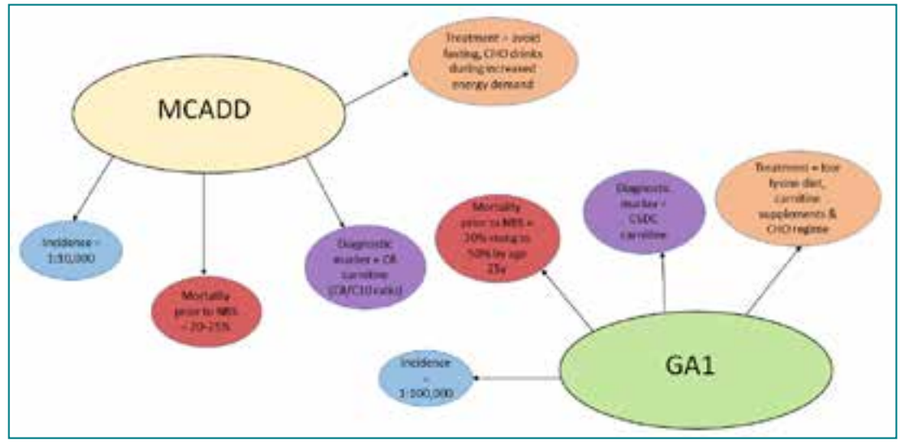

Figure 1: Spotlight showing key features of MCADD and GA1 disorders included in the NBS programme in the UK. CHO: Carbohydrate; GA1: Gluatric aciduria type 1; MCADD: Medium chain acyl-CoA dehydrogenase deficiency; NBS: Newborn blood spot.

function of many genes and whether some variants identified in them are pathological, functional testing through metabolome profiling is still more successful. An embedded hybrid approach is more likely to be beneficial in the long term.

Currently, the NBS programme is undertaking a pilot to assess the addition of a tenth disease – although not an additional metabolic condition – to add to the nine conditions already screened for. Using the DBS system already in place, laboratories will screen for severe combined immunodeficiency, a genetic disorder affecting the development of functional T cells and B cells in infants which, if left untreated, results in repeated severe infections and death within the first few years of life. Currently, the standard treatment is haematopoetic stem cell transplant, with outcomes that seem to be associated with a younger age of transplant and being free from infections.

There are other metabolic disorders likely to be added to the UK NBS programme over the next 10–15 years. Tyrosinemia type 1 is an autosomal recessive disorder due to mutations in the gene encoding fumarylacetoacetase. Screening for succinylacetone (one of the main metabolites) on DBS by MS/MS has been implemented in many countries and could easily be admitted to the existing screening programme. Tyrosinemia type 1 can present early, with liver dysfunction, growth failure and rickets, and/or later with similar symptoms as well as with neurological crises. Untreated, they can both lead to death by ten years of age. Treatment with nitisinone is effective and can prevent most of the long-term effects, justifying its inclusion in the panel.

Biotinidase deficiency is another metabolic disorder that could be added to the existing programme using MS/MS technology. Deficiency of the enzyme biotinidase leads to a loss of recycling of the vitamin biotin, which is used as a cofactor in many pathways within the body. Symptoms including seizures, hearing loss, breathing difficulties, hair loss and ataxia can present early in life. Treatment is simple and effective.

Finally, lysosomal storage disorders (LSDs) may be included. These disorders are characterised by enzymatic deficiencies that cause build-up of substrates and by-products within lysosomes, leading to multiorgan dysfunction and often early death if left untreated. For LSDs to be added to the UK NBS programme, a methodology will need to be optimised to allow use of DBS and increased throughput within a reasonable timeframe. Traditional diagnosis of LSDs involves lengthy enzyme assays to assess activity. However, recently, digital microfluidic fluorimetry has been developed to multiplex enzymatic assays with a same day turnaround on a simple to use platform. Furthermore, there are already diagnostic tests available to confirm screening positives and many disorders now have enzyme replacement therapies for treatment, which, allied with early diagnosis, result in significant quality-of-life and lifespan improvements.

The UK NBS programme has often received criticism for only screening a small number of conditions, especially compared with other countries. However, the UK has developed an exceptionally well regulated and universally available system, which screens upwards of 750,000 of infants each year with rapidly available results.[6]

Further information is available at: http://newbornscreening.org/site/index.asp

References available on our website.

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Rh-D haemolytic disease of the fetus and newborn – the role of SHOT in improving care

Dr Shruthi Narayan

Dr Susan Robinson

Dr Jennifer Davies

Following its introduction in the 1960s, anti-D immunoglobulin has successfully reduced the incidence of haemolytic disease of the fetus and newborn (HDFN), improving maternal and fetal health. This article illustrates how haemovigilance reporting of anti-D administration errors and instances of anti-D immunisation has optimised patient safety.

Indications for anti-D use to reduce risk of HDFN

Prophylactic anti-D immunoglobulin (anti-D Ig; 500 iu) is generally given within 72 hours of a post-sensitising event (PSE), with additional dosing for PSEs after 20 weeks' gestation guided by fetomaternal haemorrhage (FMH) estimation. A single dose of 1,500 iu is commonly used for routine antenatal anti-D prophylaxis (RAADP), given between 28 and 30 weeks' gestation, as recommended by the National Institute for Health and Care Excellence (NICE).[1]

Alloimmunisation to the D antigen resulting in serious sequelae in offspring still occurs, in particular owing to late or missed administration of anti-D Ig. Anti-D Ig is also recommended following transfusion of D-positive blood components to D-negative individuals with childbearing potential.[2]

Current antenatal practice in the UK recommends all D-negative pregnant women are offered RAADP, despite approximately 40% of these women carrying a D-negative fetus.[1] However, high-throughput non invasive prenatal testing (NIPT) for fetal *RHD* genotype is now available in the UK and is recommended as a cost-effective option to guide antenatal prophylaxis with anti D Ig.[3]

NIPT involves extraction of cell-free fetal deoxyribonucleic acid (cffDNA) from a maternal blood sample and can be performed as early as 11 weeks' gestation. The fetal D-type predicted by the assay can then be used to guide appropriate administration of anti-D Ig and avoid unnecessary exposure.

Reporting adverse events in the UK

Serious Hazards of Transfusion (SHOT) is the professionally led, independent, confidential UK haemovigilance reporting scheme that began in 1996, collecting and analysing anonymised information on transfusion-related adverse events and reactions. Where risks and problems are identified, SHOT produces recommendations to improve patient safety published in the Annual SHOT Report.

Anti-D Ig is made from human plasma and is classed as a medicinal product, with untoward clinical reactions such as allergy reported via the Medicines and Healthcare products Regulatory Agency's Yellow Card scheme. Adverse events involving anti-D Ig prophylaxis, post-PSE and RAADP, and in particular any procedural errors, are reportable to SHOT.

Anti-D Ig errors

SHOT data on types of errors

Failure to administer anti-D Ig within the recommended time frames or giving an insufficient dose reduces the efficacy of prophylaxis with risk of development of immune anti-D. Annual SHOT reports have identified system failures resulting in omission and delays in giving anti-D Ig, administration errors and other events involving anti-D Ig management.[4]

The data from SHOT since reporting began in the 1990s is immensely valuable in supporting learning from errors and near miss events. SHOT has also been collecting data involving errors relating to cffDNA screening since 2017. This data demonstrates the increased complexity introduced by the screening process.

A total of 3,741 anti-D Ig cases were reported between 2011 and 2020. Of these cases, 71.2% (2,662) related to omission/late administration of anti-D Ig for RAADP and following PSE. In 15 cases (reported between 2017 and 2020), RAADP was omitted based on cffDNA incorrectly predicting the fetus as D-negative, where samples taken from the cord at delivery tested D-positive. In 181 (4.8%) cases, anti-D Ig was given inappropriately to a mother with a D-negative fetus. Of these, 12 (reported between 2017 and 2020) involved administration of RAADP based on a cffDNA incorrectly predicting the fetus as D-positive, while samples taken from the cord at delivery tested D-negative.

Other errors reported to SHOT included administration to D-positive women (207, 5.5%), administration to women with immune anti-D (194, 5.2%), incorrect dose (156, 4.2%), product expired, out of temperature control or wrongly labelled (213, 5.7%) and miscellaneous (128, 3.4%).

Reasons for errors in anti-D administration and action needed

Omissions and delays occur because of failures in communication, discharge of patients before anti-D Ig is given, lack of understanding regarding the requirement for anti-D Ig and assumptions in care. Failure or delay in administration puts the woman at risk of developing immune anti-D, which can lead to HDFN in subsequent pregnancies.

SHOT has developed an aide memoire to remind staff when anti-D Ig should be administered,[5] but it is incumbent on all maternity units to review their care pathways and develop robust systems to address avoidable errors. These factors have been explored further in the SHOT Bite.[6]

British Society for Haematology (BSH) guidelines state that a minimum of 250 iu anti-D Ig should be given for PSE up to 20 weeks.[2] However, this dose is no longer available in the UK. This has contributed to some errors in administration, with clinical staff attempting to split a 500 iu dose. It should be noted that where guidelines state 'minimum', a dose of 500 iu or 1,500 iu is acceptable. Anti-D Ig is generally given intramuscularly, but products that can be given intravenously are available and should be utilised where intramuscular administration is not appropriate.

Errors in relation to cffDNA screening

The cffDNA screening program undoubtedly reduces unnecessary exposure to anti-D Ig but SHOT data demonstrates that it is introducing new challenges to the management of D-negative pregnancies. It must be noted that reporting of discrepant results to SHOT may not be comprehensive and uptake in screening is not yet universal across the UK. As more organisations implement cffDNA screening, local processes should be in place to ensure discrepant results are managed appropriately.

The screening test offered by NHS Blood and Transplant is designed to minimise false D-negative results to <0.1%. In up to 2% of tests, the result will be incorrectly predicted to be D-positive despite the baby in fact being D-negative. This small false-positive rate when using NIPT means that only 2% of D-negative women receive antenatal prophylaxis unnecessarily, rather than 40% without using the NIPT.[7] False-positive cffDNA results may occur as a result of rare, silent or variant Rh genes, or weak D alleles, vanishing twin or extraneous low-level DNA contamination of the sample. Where a fetal D-positive result has been reported but the cord blood tests D-negative, this should be reported to the testing laboratory and SHOT.

Investigations at the local level could include wrong blood in tube (WBIT; mother or cord) and weak D (cord sample), although this is not included in current guidelines. All cases of apparent false-negative cffDNA results should be reported to the testing laboratory, along with blood samples from mother and baby. They should also be reported to SHOT. Local investigations should include WBIT (cord sample) and anti-D Ig prophylaxis should be given as appropriate.

Immune anti-D

A questionnaire was introduced from January 2013 to collect information about women who have developed a new immune anti-D that is detected during pregnancy, at delivery or in a subsequent pregnancy. Cases of immune anti-D detected in women with previous pregnancy (PP) and those with no previous pregnancy (NPP) were analysed for any relationship to errors in prophylactic anti-D Ig management, maternal weight or gestation at delivery. This new initiative sought to address the lack of efficacy data for anti-D Ig prophylaxis and provide a better understanding of the causes of continuing anti-D sensitisations.

From 2013 to 2020, a total of 377 cases of sensitisation were reported – 105 cases occurred in women with NPP and 272 in women with PP. The data illustrate missed opportunities where pregnancy management is not ideal including delay in RAADP, insufficient dosing and omission of prophylaxis. A total of 69 PSE have been reported in the preceding pregnancies, of which only 46 (66.6%) were managed correctly. Furthermore, ideal management does not equate to no sensitisation. Delivery beyond 40 weeks and obesity may be risk factors for sensitisation. A comparison to the national maternity data set is required to determine if women who are obese or deliver beyond 40 weeks are over-represented.

A focused approach to ensure treatment decisions are right for D-negative women is necessary to prevent sensitisation. A review of the material available to support practice is underway. The possibility of an electronic application to support decision making should be considered. In the interim, hospitals should align local policies with the BSH addendum that signposts the more recent NICE Guidance 126 and 140 (published in 2019). Electronic health record providers and hospitals who plan to implement or continue to develop this should map the care plan for D-negative women in pregnancy and post-partum, developing intelligent pathways that support effective management and decision making.

Conclusions

Implementation of programs for antenatal and postnatal anti-D Ig prophylaxis has led to a

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SHOT adverts promoting awareness of transfusion safety.

significant reduction in the frequency of D allo-immunisation and associated fetal/neonatal complications. SHOT data demonstrates that there are missed opportunities for anti-D Ig prophylaxis where management is not ideal.

Errors can be prevented with robust management policies and processes in place, improved communication between all healthcare professionals involved in patients' care, and staff adhering to the necessary checks and taking appropriate and timely actions. However, these complex pathways are likely to benefit from electronic clinical decision support systems.

Traceability and accurate documentation are paramount to patient safety. RAADP should be given to all eligible RhD negative women in accordance with NICE guidance and with the predicted D-type of the fetus from cffDNA testing. This is a field where our understanding is constantly evolving. As more maternity services continue to adopt NIPT, reporting will increase leading to additional learning which will help identify aspects for improvement.

Women should be educated about PSE and the importance of reporting these within 72 hours of occurrence for anti-D Ig to be effective. However, data from SHOT, as discussed in this article, has shown that ideal management with anti-D prophylaxis does not prevent sensitisation in all cases, and adherence to antibody testing regimes is vital for identification and appropriate fetal monitoring.

Questions remain regarding the effect of maternal obesity and delivery beyond 40 weeks on the efficacy of anti-D prophylaxis. Haemovigilance reporting is an ongoing exercise and it is vital that the learning from SHOT reports is embedded into clinical practices, improving safety for patients.

References available on our website.

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Anaemia in pregnancy and the postpartum period

Dr Catherine Prodger

Dr Sarah Jafaar

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Affecting more than a third of pregnant women worldwide, maternal anaemia is a significant public health issue and can have serious consequences for mothers and babies. A recent NHS audit examines the issues and treatments for it.

Introduction

The impact of anaemia occurring in pregnancy and the postpartum period should not be underestimated; it is a public health problem that affects low-, middle- and high-income countries, and has significant adverse consequences, not just on health but also on social and economic development. Furthermore, maternal anaemia is associated with increased risk of maternal and perinatal mortality, irrespective of confounding factors.

The World Health Organization estimated that, worldwide, 38% of pregnant women were anaemic in 2011, equivalent to 32 million pregnant women.[1] Iron deficiency accounts for the majority of these cases and is the most common cause of anaemia in the obstetric setting, with additional common causes including genetic red cell disorders, infectious disease and folate deficiency. Data from the UK, where iron is widely available and national guidelines for the management of iron deficiency in pregnancy have been in place since 2012,[2] suggest that, where guidelines are adhered to, maternal anaemia is identified promptly and managed appropriately. However, there remain key aspects of prevention and treatment that require greater attention.

Definition of anaemia in pregnancy

The British Society for Haematology defines anaemia in pregnancy as a haemoglobin concentration (Hb) <110 g/L in the first trimester, <105 g/L in the second and third trimesters, and <100 g/L postpartum.[3] This definition, which is based on lower Hbs than in non-pregnant women, reflects the differential physiological expansion of red cell mass and plasma volume that occurs in pregnancy; expansion in plasma volume almost doubles that of the red cell mass and results in haemodilution.

This change begins at around 12 weeks' gestation and is maximal by the end of the second trimester. The fetal demand for iron and enhanced maternal red cell production significantly increases iron requirements and risk of iron deficiency anaemia, particularly as many women of childbearing age begin pregnancy with reduced iron stores. Untreated antenatal iron depletion may lead to postpartum anaemia, which can also be caused by increased blood loss at delivery, and can be inversely correlated with Hb (Figure 1).

Although the major burden of maternal anaemia is borne by low- and middle-income countries, particularly Sub-Saharan Africa and South East Asia, anaemia affects women in every country. In the WHO *2020 Global Nutrition Report*, no country was on track to meet the target of a 50% reduction in maternal anaemia by 2025.[4] In the UK, an audit of the management of maternal anaemia and iron deficiency carried out by NHS Blood and Transplant (NHSBT) in 2019 found the prevalence of iron deficiency anaemia in pregnancy, in some centres, to be as high as 30.4% and 41.3% in the puerperium.[5]

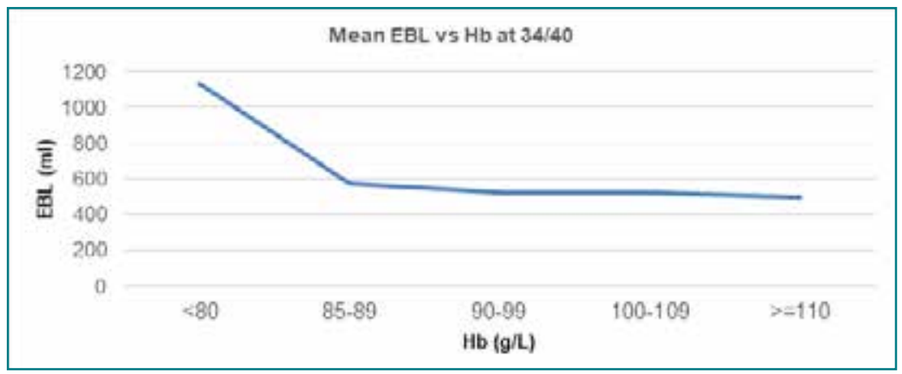

Figure 1: Mean estimated blood loss at delivery (ml) by severity of anaemia at 34 weeks' gestation. Local survey of 7,402 pregnant women in Oxford, with 6,332 having a blood test at 34 weeks. EBL: Estimated blood loss; Hb: Haemoglobin.

Table 1: Treatments for iron deficiency anaemia.

Treatment	Antenatal indications	Postnatal indications
Oral iron	Low Hb – used as a diagnostic trial and continued if response is seen OR non-anaemic but identified as being at high risk of iron deficiency	Haemodynamically stable AND mild/no symptoms
Intravenous iron	Intolerant or non-compliant with oral iron Hb <100 g/L and 34 or more weeks' gestation	Intolerant of oral iron OR severe symptoms
Red blood cell transfusion	Bleeding OR severe anaemia not related to iron deficiency	Continued bleeding or risk of further bleeding OR haemodynamic instability OR symptoms requiring urgent correction

Hb: Haemoglobin.

Why does maternal anaemia matter?

Maternal anaemia has important consequences including symptoms such as fatigue, cardiovascular strain, and thyroid and immune dysfunction. It also increases the likelihood of blood transfusion, with risk of adverse events including red cell alloimmunisation, in turn predisposing the fetus/newborn to haemolytic disease and potentially causing issues around obtaining compatible blood for mother and baby. Maternal anaemia is also associated with low birth weight,[6] preterm birth,[7] postpartum haemorrhage and increased maternal and perinatal mortality. Following childbirth, anaemia is associated with fatigue and increased risk of postnatal depression,[8] both of which have been shown to improve following iron supplementation.[9] The risk of sepsis and poor wound healing may also be increased.

UK guidelines

Evidence-based guidelines are in place in the UK to aid prompt diagnosis of maternal anaemia and appropriate treatment.[3] These guidelines advise that all pregnant women receive dietary advice to optimise iron intake and that Hb is routinely checked at booking and at 28 weeks' gestation. If anaemia is diagnosed, a trial of oral iron should be initiated promptly and used as a diagnostic tool, with assessment for Hb response 2–4 weeks later. Counselling in the correct administration is important to aid absorption and minimise side effects; 40–80 mg elemental iron to be taken once daily or on alternate days, early in the morning, with a glass of water or orange juice on an empty stomach, one hour before food, drink or other medications.

It is important to identify those women who are not yet anaemic but are at risk of iron deficiency, for example those with previous anaemia, an interpregnancy interval of less than a year, multiple pregnancy or multiparity. They should either be offered oral iron empirically or have their serum ferritin checked to identify iron depletion. Ferritin should also be checked in women with a known haemoglobinopathy to identify concomitant iron deficiency and exclude iron-loading states.

Intravenous iron should be reserved for anaemic women in the second trimester onwards who have absolute intolerance of or are unresponsive to oral iron, and women presenting after 34 weeks' gestation with confirmed iron deficiency anaemia and Hb <100 g/L where there is insufficient remaining time before delivery for correction of anaemia with oral iron (Table 1). Women at risk of postpartum anaemia because of blood loss >500 ml, uncorrected antenatal anaemia <105 g/L or symptoms consistent with anaemia should have their Hb checked within 48 hours of delivery. If anaemia is confirmed, iron replacement with oral or intravenous iron should be implemented unless there is cardiovascular compromise and blood transfusion is considered instead (Table 1).

Table 2: Numbers and rates of antenatal anaemia at Oxford University Hospitals, 2018 (n=7,402).

Stage of pregnancy Hb level tested	n	Mean Hb g/L (range)	Median	No of pts anaemic (Hb <110 booking, Hb <105 2nd/3rd TM, Hb <100 PP)	% anaemic of those tested
At booking appointment	4,886	128.7 (62–174)	129	110	2.3
28/40	6,313	115.2 (52–149)	115	790	12.5
34/40	6,322	115.6 (73–156)	115	696	11.0
Pre-delivery	4,232	121.4 (51–225)	122	278	6.4

Hb: Haemoglobin; PP: Postpartum; pts: Patients; TM: Trimester.

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Table 3: Results of a single centre audit of postpartum anaemia.

All patients	n=138	Hb checked
Indication for postnatal Hb check	60 (43%)	Yes: 52 (87%) No: 8 (13%)
No indication for postnatal Hb check	78 (57%)	
All postpartum anaemia	n=32	
Treated	29 (90%)	
Not treated	3 (10%)	
Indicated treatment		Received indicated treatment
Iron (oral or IV)	29 (91%)	27 (93%)
Blood transfusion	2 (6%)	2 (100%)
Unclear from documentation	1 (3%)	

Hb: Haemoglobin; IV: Intravenous.

Gap between guidelines and practice: the importance of audit

Despite these clear recommendations, a national comparative audit in the UK carried out by NHSBT in 2019 raised concerns around the management of maternal anaemia and iron deficiency with variable implementation of guidelines.[5] In the 86 centres that were studied, involving 860 births, only half of the women diagnosed with anaemia in the first trimester were commenced on oral iron therapy, falling to 30% of women diagnosed with anaemia at 28 weeks' gestation.

By contrast, local audit data from Oxford University Hospitals NHS Foundation Trust, where guidelines and pathways for the management of maternal anaemia have been in place for the past seven years, showed that of 7,402 women, 2% were anaemic at booking, 12% at 28 weeks' gestation and 11% at 34 weeks' gestation (Table 2). While these values compare favourably with the NHSBT audit, the rise in incidence between booking and 28 weeks is reflective of the large number of women with non-anaemic iron depletion who would benefit from empirical iron given at their booking appointment.

An audit of postpartum anaemia in the same centre in 2020 showed that 87% of women at risk of postpartum anaemia had their Hb checked within 48 hours of delivery, with 93% of those diagnosed with anaemia and eligible for treatment with iron replacement receiving it (Table 3). This is an improvement on the national audit data, which found only 78% of women diagnosed with postpartum anaemia received iron replacement.

Summary and conclusions

Reducing maternal anaemia is a priority for the health of women and children across the world. The prevalence of anaemia is higher in low-income countries where contributing factors such as haemoglobinopathies and infectious disease are more common, but iron deficiency remains the most common cause of maternal anaemia globally and in developed countries. Disappointingly, 30.4% of pregnant women in certain UK centres were diagnosed with iron deficiency anaemia in 2019, despite the ready availability and effectiveness of oral iron replacement. Guidelines for the prevention and treatment of maternal anaemia have been available for many years, and the positive audit data from Oxford confirms the importance of adherence to these guidelines if the prevalence of maternal anaemia is to be reduced and maternal and child health improved.

References are available on our website.

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Post-partum haemorrhage in Africa: achievements and ongoing challenges

Post-partum haemorrhage remains the leading cause of maternal mortality in Africa. This article explores the challenges countries face in reducing maternal deaths and the progress made so far.

Post-partum haemorrhage (PPH) remains the leading cause of maternal deaths in individual countries in Africa and collectively on the continent.[1,2] Accounts of maternal deaths from many traditional African societies have stories of how women performed rites to ensure safe delivery of their babies and to signify their deliverance when they were so close to death.[3]

High infant mortality and a lack of modern contraceptives combined with overall low-income levels led to women having high parities, resulting in raised maternal mortality and subsequently low life expectancy at birth in the 1950s. Life at birth rose from 36.7 years in the 1950s to 48.4 years by 2000–2005 in many sub-Saharan African (SSA) countries.[4–6]

The pro-natalist view of many societies in Africa, largely fuelled by high neonatal and infant mortalities, encouraged women to have more children with the hope of at least some surviving into adulthood. Closely accompanying the high parity were obstetric complications of ruptured uterus, retained placenta and excessive bleeding post-delivery.

Anaemia in pregnancy increases the risk of mortality when PPH occurs; anaemia is prevalent in both non-pregnant and pregnant women in most African countries. Correction of anaemia in these populations should therefore be part of the strategy in preventing deaths from PPH.

Access to modern health care during the colonial era of many African countries was limited to a small segment of the population and post-independence, expanding access has been slow. Therefore, cultural values, limited skill in the management of delivery complications (especially surgical ones) and low socioeconomic development combined to give high mortality rates of which PPH has always been the leading cause – about 60,000 of the 201,000 maternal deaths in Africa in 2015.[7]

Reducing the maternal mortality ratio

A review of the literature of western medicine shows how key developments have resulted in a significant reduction in maternal mortality including safe anaesthesia, blood transfusion, surgery (especially caesarean section and safe abortion) and antibiotics at the closing stages of the World War II.[8]

For almost all SSA countries, the post-independence era up to the early 1990s was characterised by very high maternal mortality ratios (MMR), about 1,000 or more per 100,000 livebirths. The leading causes of direct maternal mortality are PPH, pre-eclampsia/eclampsia, sepsis (post-abortion or post-partum) and obstructed labour.

The UN-led Millennium Development Goals brought the urgent need to address developmental challenges into sharp focus and goal 5 aimed to reduce maternal deaths by three-quarters over 25 years using the 1990 figures as the base.[9] Although most African countries were unable to achieve goal 5, some progress was made in almost all countries. By 2015, the regional MMR was estimated to be 542 per 100,000 livebirths – a 44% reduction. The annual percentage reduction between 1990 and 2015 was 2.3% for the African region, making it the region with the lowest achieved gains.[7,10]

Making progress

The modest progress that many African countries have made in bringing down the MMR over the last 30 years or so is mainly a result of greater access to maternity care and increased use of modern contraceptives. Access to maternity care has improved the management of the top two causes of maternal deaths, PPH and eclampsia. This has been through the use of oxytocics in active management of the third stage of labour (AMSTL) to prevent haemorrhage, and anti-convulsants to prevent eclampsia. Significantly, maternal deaths have been averted by the use of contraception, helping to reduce the number of pregnancies.

Availability of care

The development of signal functions and other tools in emergency obstetric and neonatal care (EmONC) highlighted the physical infrastructure and healthcare workforce that governments must put in place to prevent maternal deaths.[11]

Travelling long distances to access maternity care is a limiting factor and in cases of primary PPH, it becomes a critical determinant in the outcome. Wong and colleagues reported that spatial separation between women and the delivery facilities in low-resource settings needs further development, and lack of geographic access impedes use.[12] Scenarios like this can promote home delivery with its attendant dangers. The number of countries identified in this systematic review and metanalysis were limited because of lack of data from most African countries.

The role of birth attendants

Reducing maternal death from PPH requires the availability of skilled birth attendants (SBA) and having sufficient midwife numbers is key to achieving this reduction. The presence of skilled personnel in intrapartum and post-partum care (where over 98% of maternal mortalities occur) cannot be overemphasised.

Competent labour management to prevent prolonged labour, practise of AMSTL and early recognition of excessive blood loss and prompt intervention are collectively important in the prevention of haemorrhage. The pooled prevalence of SBA in the 12 East African countries was 67.2%, ranging from a low of 11.9% in Tanzania to 90.7% in Rwanda.[13] Similar patterns can be found in other regions of SSA.

The midwife ratio to population has improved significantly over the last two decades.[14] Some countries, for example Ghana, have introduced direct entry into midwifery schools instead of the previous system of completing three years of nursing training and practicing for a few years before entry into midwifery training.

Accompanying an increase in the availability of midwives is an improvement in doctor-patient ratios. In 2003, Ghana started its own postgraduate medical college, and the absolute numbers of doctors has increased from around 2,000 to the current number of 8,957, giving a ratio of 1 to 3,350.[15] Distribution is however skewed in favour of cities like Accra and Kumasi. Similar trends are common in many SSA countries.

The use of contraceptives

Contraception uptake has increased in many SSA countries and contraception alone is known to avert deaths by preventing pregnancies. Unplanned or unwanted pregnancies are high in SSA countries and unsafe abortions can end in sepsis, while carrying the pregnancy to delivery can lead to PPH. Nearly a half of all pregnancies are unplanned or mis-timed.[16] Saifuddin and colleagues showed that over 88,227 maternal deaths were averted in 2015 and 31.9% of these averted maternal deaths were attributed to contraceptive use.[10]

The Family Planning 2020 initiative is a global effort to ensure an additional 120 million women have access to contraceptives and progress in African countries has been satisfactory. The countries involved (Nigeria, Ghana, Burkina Faso, DR Congo, Uganda and Ethiopia) are making fair progress, with Ghana having the highest annual percentage point increase.[17] If progress in meeting this unmet need is sustained into the next few decades, the proportion of deaths averted by contraception will not only be maintained, but increase further.

The way forward

PPH leading to maternal death is still common and the leading cause of maternal death (about 60,000 out of 201,000 maternal deaths in 2015).[7] To reduce PPH and the resulting maternal deaths, health facilities and skilled personnel must be available close to communities so labour and its complications can be appropriately managed. This includes basic and comprehensive EmONC facilities to ensure women with PPH can receive the care they require as quickly as possible. Access to comprehensive EmONC facilities (for surgery and blood transfusion) within reasonable distances is vital to address PPH and other obstetric emergencies.

EmONC assessments show significant gaps in both basic and comprehensive facilities in many countries.[18,19] The strategies that brought the 44% reduction in regional MMR during 1990 and 2015 must be sustained and expanded within the Sustainable Development Goals framework. However, this requires major investments in the health sector by both public and private sources and the efficient use of such resources.

Maintaining the appropriate storage temperature for oxytocics is challenging and an efficient cold supply chain is needed with constant monitoring. The leading cause of PPH, uterine atony, can be controlled through the use of oxytocics, however, poorly stored oxytocics are ineffective in achieving uterine tonus.[20]

The strategic placement of safe blood services is important in reducing MMR from PPH. Rwanda and Ghana use drones to circumvent the challenge of transporting blood and other products to hard-to-reach rural communities. This technology must be expanded, and sustainability frameworks established to ensure long-term success. However, the use of drones should augment the existing health infrastructure (EmONC facilities) and not be seen as a replacement.

Increasing the number of trainee midwives should be a priority to provide adequate distribution across countries and ensure midwives of retirement age are replaced. Curricular reviews are needed to enhance the skill set and practical experience gained during training. The training of obstetricians and the deployment of obstetricians, midwives and anaesthetists to under-served areas is more challenging. However, these challenges are surmountable by developing policies to attract these personnel to these areas, such as mandatory intern rotations to such communities and inducements.

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Conclusion

Over the last 150 years, Africa has transitioned from home deliveries with high MMR to increasing institutional deliveries with availability of surgical and transfusion services. The expansion in access to maternity services must be continued to further reduce maternity mortality and the occurrence of PPH. Initiatives to increase access to contraceptives need to expand and accelerate to reduce maternal mortality further.

References are available on our website.

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Leading and developing yourself, your team and the world as a UKAS consultant technical assessor

Dr Sreekala Sreehari

The United Kingdom Accreditation Service (UKAS) helps pathologists worldwide to improve their profession through training in standardised practices. By becoming a UKAS technical assessor you not only enhance your own diagnostic skills, but also improve the quality of services for patients.

'Amma (Mother), you told me your job is to diagnose cancer. Then why do you want to learn ISO, which grandfather (who was an automobile group manager) used to do?'

My little girl was always confused about what her mother actually did. I said I was a doctor, but I did not see patients like her father, a physician. Instead, I diagnosed cancer under a microscope. Her friends never accepted her mother as a doctor so she used to introduce me as a teacher, which was more understandable. Now, this journey to the UK to learn about the International Organisation for Standardisation (ISO) through UKAS confused her further.

Improving standards

During my specialist registrar days in histopathology in the UK, quality was never something I was concerned with, as it was taken for granted. But when I returned to the UK in 2016 for a short-term consultant job at Mid Cheshire NHS Trust after a few years of consultant experience in India and the United Arab Emirates (UAE), it struck me. The department's efforts and success in a UKAS ISO audit and seeing how effectively the ISO framework brings quality in a structured manner amazed me.

When I returned to the UAE, I attended the session offered by the RCPath–UKAS collaboration in Dubai in February 2017, entitled 'Becoming a College Assessor'. Mr Paul Stennett, the former Chief Executive Officer of UKAS, gave a wonderful presentation on the UKAS standard 'Medical Laboratories Awareness' (ISO 15189:2012) and the value it adds to labs. So, it was natural for me to come to the UK in November 2017 to be trained as a UKAS technical assessor at Denham Grove, and I attended my first assessor's workshop in March 2018. It opened up a whole new window, letting in light that trickled through many unused areas of my brain.

My first year as a trainee assessor gave me opportunities to work with excellent mentors, assessment managers and co-technical assessors. After a few assessments, I was signed out. The training, support, feedback and motivation I received from day one at UKAS were superb. As the histopathology gurus say, this is a magnificent specialty where clinical medicine meets laboratory medicine. This is an opera, where everyone – from clinicians, nurses, assistants, radiologists and specimen reception, to the whole histotechnical staff and, finally, the histopathologists and office staff – needs to be in tune to provide a wonderful, timely and quality report. When histopathologists have an opportunity as technical assessors to look in-depth at all the processes that come together to produce a high-quality service through the lens of the ISO 15189:2012 framework, it can result in excellent teamwork in the department with efficient clinical leadership.

How can you benefit from UKAS?

Each UKAS assessment is an enlightening experience. The knowledge and experience obtained is incomparable to any textbook learning or course one attends. The UKAS practice of supportive and pragmatic approaches focused on the customer and quality totally changed our mindset in our own histopathology practice. The ISO framework instils a feeling of righteousness in us, boosting our ethical and moral understanding, and making us more empathetic.

We are no longer ashamed of our mistakes because we know each identified mistake is a great lesson for generations to come, as the corrective and preventative actions will be documented. Root cause analysis identifies the gaps in our system and measures are taken immediately to make our methods robust and patient safe. As we say in UKAS, any department where everyone has access and is open to Datix reporting is a patient-safe department.

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As the RCPath country advisor to the UAE, the opportunity to be on a UKAS team opened up channels to support and guide our departments in the UAE, bringing them on par with RCPath standards. Every visit back to the NHS as a UKAS technical assessor gave me new ideas to improve quality in practical ways. These ideas were included in my presentations at Emirates Medical Association Pathology meetings and international conferences, and I am keen to use my experience to improve quality and standards worldwide.

As a UKAS technical assessor, you are expected to do a minimum of three assessments in a year. You can always arrange all three in a week, to focus on them in one go. This yearly opportunity is an immense refresher course. Visualising and analysing 360 degrees of another histopathology department enforces our own knowledge; at the same time, identifying the gaps will give the department an opportunity to improve. A few examples of this include examining the efficiency of managing the consultant's workload using RCPath workload points, observing local protocols for technical workload management, using the pathology quality assurance dashboard for improving staff happiness and staff retention, and understanding the technological innovations implemented, including digital pathology. Altogether, these experiences cleanse our system and result in quality-focused histopathologists and engaged clinicians.

The opening and closing meetings, and the assessment process itself, are thought-provoking experiences. Apart from improving your histopathology diagnostic skills, you will enhance your communication and teamworking skills. I always felt that each assessment was a learning course in itself, embedded in all four domains of Good Medical Practice guidelines: knowledge, skills and performance; safety and quality; communication, partnership and teamwork; and maintaining trust. This continuous learning and development of skills adds value to your own appraisal process. Even after retirement, working as a UKAS technical assessor gives you ample opportunities to keep in touch with your favourite profession.

Last but not least, the happiness and gratitude you feel on reassessing a lab where you picked up some gaps in the past cannot be described in words. They might have not only closed the gaps, but also implemented more innovative and modern technologies to the extent that you even cannot recognise the previous issues.

I hope more and more histopathologists will join the UKAS team and support histopathology departments in the NHS and worldwide, using an ISO framework based on RCPath standards and GMC Good Medical Practice guidelines to improve their own abilities and the profession as a whole.

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Professor Alastair MacMillan

Is our freedom from brucellosis going to the dogs?

Despite typically being unheard of in the UK, brucellosis has started to appear in dogs imported from overseas. Veterinarians and infectious disease groups are now studying its impact.

History and historical public health importance

Brucellosis is an infectious disease familiar throughout much of the world, although it is declining in importance in developed countries and is rarely seen in the UK.

The story behind the discovery of the disease's cause – responsible for so much sickness and so many deaths among British soldiers evacuated to Malta during the Crimean War – is a fascinating one.[1] Indeed, Florence Nightingale was the disease's most famous victim, suffering repeated bouts over several years with the last six years of her life spent bedridden with severe spondylitis resulting from the infection.[2]

The work of the Mediterranean Fever Commission under the leadership of Sir David Bruce in the early years of the 20th century was a masterclass in the investigation of a new and emerging disease.[1,3] It became clear that brucellosis, as it was later called, was a zoonotic disease that humans contracted almost exclusively from contact with animals or their dairy products. Over the coming few years, human brucellosis was discovered emanating from a variety of farm animals, such as sheep, goats, cattle and pigs.

Species of *Brucella*

By 1920, similar organisms isolated from farm animals and pathogenic in humans were unified as 'the classical species' into a single genus, *Brucella*. Over the succeeding years, a series of additional species were identified from a wide range of wildlife, aided by recently developed genomic methods. The list of animal hosts is now long, including domesticated and wild terrestrial mammals, marine mammals, fish, and amphibians. A species of *Brucella*, only known to infect dogs and people, was identified and named *Brucellosis canis* in 1966.[4]

Brucellosis as a zoonosis

Brucellosis is a disease of enormous public health concern worldwide, a classic zoonosis and one of the most commonly acquired in the world – the vast majority of cases originate from cattle, sheep, goats or their produce.[5] Therefore, brucellosis can be an occupational disease affecting people working directly with infected farm animals, particularly around parturition, or it can be a disease acquired in the community through the consumption of dairy products.

In comparison with brucellosis acquired from farm animals, brucellosis acquired from dogs has been significantly less important, although this is difficult to quantify owing to the limited number of epidemiological surveys and most information being contained in case reports.[6]

Although usually less severe than infection with classical species of *Brucella*, the disease in humans is characterised by fever, weakness, malaise, arthralgia and headache. Untreated, more severe pathology, including arthritis, endocarditis and encephalomyelitis, may develop and persist over many months, with relapses occurring over years.

However, apart from laboratory workers, cases generally only involve dog owners, breeders or veterinarians who assist with parturition or are in close contact with the bitch or puppies soon after birth.[7]

Safety

The classical species of *Brucella*, plus *B. canis*, are classified in Hazard Group 3 by the Advisory Committee on Dangerous Pathogens. *Brucella* is one of the most easily acquired laboratory infections and has been exacerbated in the past by misidentification and resultant inappropriate handling.[8–10]

Dog imports

In the past, very few dogs were imported into the UK, largely owing to the requirement for a six-month quarantine period. Over time, conditions for importation were relaxed, including the introduction of the Pet Travel Scheme (PETS), a subsequent reduction in the age limit permitted to travel and a reduction in the post-rabies vaccination wait period, which led to much freer movement and, consequently, a much larger number of dogs entering the country. This has been exacerbated by an increase in the number of illegally imported dogs, either commercially traded dogs being imported using PETS or falsely declaring the ages of puppies.

One particular aspect of this movement is the growth in the number of rescue dogs being

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imported from eastern Europe, which increases the threat of the importation of exotic diseases including rabies.[11]

The net result is an increase in the number of shipments of supposedly non-commercially traded dogs under PETS from over 85,000 in 2011 to over 300,000 in 2019. Unfortunately, the origin of these dogs is unknown as it is not recorded. However, the number of commercially traded dogs imported from Romania in 2020 was over 50% higher than in 2019, increasing to nearly 30,000 dogs. Significant increases in imported dog numbers are also recorded for Hungary, Poland, Bosnia and Herzegovina, Russia and Greece.[12]

Recent cases in the UK

Canine brucellosis is endemic in many parts of the world, but in the past it was not known to exist in the UK and was also rare in western Europe.[13] Canine brucellosis is not currently notifiable or reportable in dogs. As there are no pre- or post-import testing requirements and UK veterinarians are unlikely to initially suspect it, it is possible that previous cases have gone unrecognised. However, as the specialist techniques required to identify *Brucella* are only generally available in government laboratories, it is unlikely that isolations of *B. canis* would not have been known to the authorities.

Before the millennium, *B. canis* had never been isolated in the UK until a single isolation in a dog imported from Spain in 2002.[14] However, in 2017 there were two isolates in dogs imported from Bosnia and Romania.

Following the summer of 2020, an increasing number of brucellosis cases in dogs were confirmed following the clinical suspicion of private vets or provisional identification in veterinary laboratories using bacteriology, serology or polymerase chain reaction.[12]

By early 2021, over 40 definitive or presumptive diagnoses of canine brucellosis based on laboratory, clinical and epidemiological evidence had been made. This number included a large outbreak in a household in the UK with evidence of transmission between dogs. Other cases are believed to have acquired the disease outside of the UK, and these have all been dogs adopted by UK owners from organisations specialising in rehoming dogs from overseas, particularly young dogs imported from Romania.[12]

Because of the sudden increase in cases, the Human Animal Infections and Risk Surveillance group has carried out a risk review.[12]

Veterinary and public health significance

Unprotected contact with contaminated tissues and fluids associated with parturition or spontaneous abortion in infected dogs is believed to present the greatest risk of exposure to human and canine contacts. Thus, individuals most at risk – either domestically or in an occupational setting, such as breeders, kennels and veterinary laboratory staff – should minimise exposure and employ suitable infection control procedures, including the use of adequate personal protective equipment. If the large number of imported dogs from endemic countries continue to enter the UK in an uncontrolled manner, they will present an ongoing exposure risk to the UK canine and human populations.

It appears that human infection with *B. canis* is less easily acquired than infection with the classical species of *Brucella*. However, young children and immunocompromised individuals are believed to be at greater risk of infection and possibly clinical disease. The risk during pregnancy is likely to present a potential for adverse outcomes.[15]

Since summer 2020, more than 250 individuals with exposure to *B. canis*-infected dogs in the UK were risk assessed and offered testing as appropriate. To date, no confirmed human cases of *B. canis* infection have been reported in the UK.[12]

The clinical signs of canine brucellosis are variable and vague, and some animals are asymptomatic. Treatment with antimicrobials is difficult and often unsuccessful with occasional recrudescence. If an infected animal is not euthanised, neutering combined with a long course of an appropriate antibiotic regimen is the best way to minimise the risk of spread to other dogs and human contacts. However, this is not always successful in preventing relapses, with intermittent bacteraemia and the potential for transmission.[16]

Dogs who have appeared to recover must therefore be considered as a threat to people and dogs for the rest of their lives. In particular, owners should be made aware of this risk and try to avoid very close contact with other dogs. This is particularly the case in breeding establishments or households with many dogs. Veterinarians should be aware of the greater risk when carrying out surgery, particularly on the reproductive tracts, or assisting parturition.

References are available on our website.

Professor Alastair MacMillan
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Dr Gkikas Magiorkinis

SARS-CoV-2: mutations, variants and traits

The easing of lockdowns around the world is threatened by the evolution of new, potentially more dangerous variants of COVID-19. Significant efforts are underway to track genomic mutations and better understand the spread of these developments.

The first SARS-CoV-2 full genome was recovered on the 5 January 2020 from a patient who was admitted to the Central Hospital of Wuhan on 26 December 2019.[1,2] By harnessing the brute force of high-throughput sequencing metagenomics, the aetiological agent of COVID-19 was identified within ten days from suspicion of emergence. By comparison, in 2003 it took a considerably longer time to isolate partial sequences of SARS-CoV-1.[3] The fast characterisation of the full-length SARS-CoV-2 genome accelerated the development of effective vaccines, as well as our understanding of the virus's behaviour through research.

The mutational capacity of SARS-CoV-2

Coronaviruses have large genomes for RNA viruses, at the magnitude 30,000 nucleotides, and are considered the champions of RNA virus genome size.[4,5] Analyses of mutational rates among RNA viruses suggest that there is a negative correlation between the genome size and the mutational rate.[6] We thus expect that SARS-CoV-2 has a mutational rate at the low-end of typical RNA viruses. Crucially, it has been shown that the coronaviruses, including SARS-CoV-1[7] and SARS-CoV-2,[8] have enzymes with proofreading ability. This allows them to correct errors in their processes, which likely reflects the low mutation rate observed despite being RNA viruses. The modulation of proofreading and genomic fidelity seems to be an important factor for coronavirus biology, which is without precedence in other RNA viruses.[9] The resulting mutational rate seems to be at the range of one to two mutations per genome per month.[10]

Variants, mutations and traits

The interest in mutations affecting the phenotypic properties of SARS-CoV-2 is mainly focused on mutations occurring at the spike protein, which is responsible for infecting cells but is also a major target of neutralising immune responses.[11] Such mutations are likely to affect the binding affinity (transmissibility) and immunological escape (vaccines, past infection). New strains are considered to be variants of concern (VOC) if the phenotypic properties (such as transmissibility, immune escape and pathogenicity) of the new evolutionary clade are expected to increase the burden on the public health system as a result of their spreading.[12] If there is preliminary data for the phenotypic change, but the evidence is not substantial enough to prove the hypothesis, then the clade is considered a variant of interest (VOI). For example, if strains belonging to a specific clade increase their frequency disproportionally within a period, this can be considered preliminary data for increased transmissibility or immune escape. However, because this is circumstantial evidence, the strains are VOI until more data (e.g. independent increase in frequency in multiple geographical regions) support the application of the term VOC. As of 31 May, the World Health Organization started to use letters of the Greek alphabet to simplify naming significant variants in the lay public media.

Strains carrying the mutation D614G at the spike protein became prevalent, initially in Europe and then worldwide, several months after the pandemic was established. This mutation, nicknamed 'Doug', has been shown to improve viral fitness through increased viral productivity.[13]

Another significant mutation, one that has rapidly increased its frequency during 2021, is N501Y, nicknamed 'Nelly'. The mutation has been identified in clades that increased their frequency independently in the UK (lineage B.1.1.7/Alpha), South Africa (B.1.351/Beta) and Brazil (P.1/Gamma), all of which are VOC. The mutation lies within the spike's receptor binding domain, resulting in increased binding affinity with the human ACE2 receptor. Phenotypically, this is thought to increase transmissibility of the virus.

The mutation E484K, nicknamed 'Eeek', has been identified as an integral part of two VOCs (B.1.351 and P.1), but has also risen independently in strains belonging to other lineages. The mutation has been shown to decrease the neutralising activity of antibodies against strains that circulated during the first wave of the pandemic, as well as strains used for the development of vaccines.

Variants of concern

B.1.1.7/Alpha

The rapid spread of B.1.1.7 across England coincided with the emergence of the second wave of infections.[14] The first sequences of the lineage were isolated in September in Kent and London. The variant has multiple mutations compared with the 'wild' pandemic strains, most strikingly the

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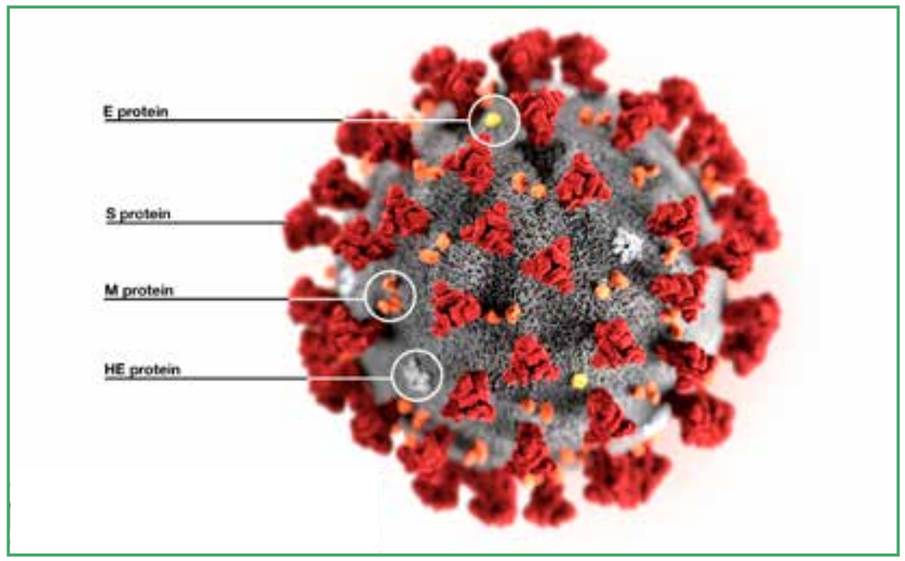

N501Y mutation and Δ69–70 deletion. The mutational rate that leads to the lineage is faster than expected given the evolutionary rate observed in other clades, suggesting that the mother strain was generated within an immunocompromised individual. This hypothesis is based on the observation that weak immune responses over longer periods of carriage allow the strains to evolve a wider variety of mutations and thus adaptions,15 which also highlights the potential of generating SARS-CoV-2 variants in populations with high prevalence of HIV and AIDS.[16]

The deletion Δ69–70 is coincidentally located on one of the targets of a widely used diagnostic assay, resulting in failure of the assay to detect the presence of an S-gene in the sample (S-gene Target Failure, SGTF[17]). Owing to the wide availability of the method, SGTF has been used as a marker of the spread of the variant, initially in the UK and subsequently around the world. B.1.1.7 has been demonstrated to increase transmissibility and potentially increase pathogenicity,[18] although within hospital cohorts failed to support increased pathogenicity.[19] The increase of transmissibility is estimated to be around 50–80% on the effective reproduction number (Rt)[20] when compared with the Rt of strains circulating at the same time and place, but around 20–30% on the age-adjusted attack rate[21] when compared with the attack rate of strains circulating at the same time and place. The ability of B.1.1.7 to evade immunity due to past infection or vaccination from wild-type strains seems to be minimal.[17]

P.1/Gamma

P.1 has been associated with the emergence of a rapid and strong second wave of infections in the Brazilian state of Manaus,[22] despite reports of high infection rates during the first wave of the pandemic, which suggested a near-to-herd population level of immunity.[23] P.1 carries both N501Y and E484K, as well as a constellation of multiple mutations resulting from an accelerated evolution that led to the foundation of the lineage. Similar to B.1.1.7, it is thought that the mother strain was generated within an immunocompromised individual. The variant has been termed as VOC with an estimated two-times multiplicative increase of the Rt when compared with strains co-circulating in Manaus, but also a 30% decrease of immunity with respect to past infections due to non-P.1 strains estimated at the population level. In vitro studies of the neutralising activity of sera from BNT162b2 (Pfizer) fully immunised vaccine recipient volunteers suggested that immune escape is unlikely.[17] The rapid increase of P.1 in Manaus coincided with increased stress on the health system, however there is not sufficient data to support robustly an increase of morbidity or mortality of P.1 compared with other strains.[22]

B.1.351/Beta

The rise of the second wave of SARS-CoV-2 in South Africa in October 2020 coincided with the emergence of B.1.351, a lineage that seemed to spread even in metropolitan areas that were heavily affected during the first wave.[24] B.1.351, similarly to P.1, carries both N501Y and E484K, thus an increase of transmissibility and/or immune escape has been hypothesised. A selective advantage of B.1.351 over co-circulating strains has been demonstrated, as well as a lack in efficacy of the ChAdOx1 to minimise disease in mild-to-moderate COVID-19.[24] The efficacy of other vaccines remains at acceptably high levels, albeit reduced with respect to previously circulating strains.

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Variants of interest

Apart from the three well-studied VOCs, several other strains have been proposed to have phenotypic traits that could increase the public health burden as a result of their spread and thus have been classified as VOI. In April, the epidemic in India entered a strong second wave with more than 300,000 cases and 2,000 deaths per day, contrasting with the peak of the first wave when the number of cases were 100,000 per day.[24] The resurgence of COVID-19 in India has coincided with the increase of the frequency of B.1.617 in specific geographical locations that were hardly hit during the first wave. The first B.1.617 isolate was sequenced on 5 October 2020, while strains were sequenced in UK and US at the end of February 2021.[24]

The variant carries multiple mutations, with two of them, E484Q and L254R, in the spike gene, which are considered potentially important owing to the association of the amino acid positions with immune escape and binding affinity. Until the end of April, the evidence was not sufficient to suggest that all strains classified as B.1.617 can be categorised as VOC. However, at the beginning of May this year, B.1.617.2/Delta was classified as VOC owing to its significant spread in the UK.

Screening strategies for mutants

The emergence of lineages with altered phenotypic traits could potentially undermine efforts to control the spread of the epidemic. A molecular surveillance plan is imperative to allow for continuous monitoring and identification of potentially concerning variants that would require faster public health interventions. Full-genome sequencing is the gold standard for identifying novel strains, so for a successful screening strategy at least a proportion of new cases need to be fully sequenced. As specific mutations are associated with phenotypic traits of transmissibility, immune escape and morbidity in different variants, screening of these particularly important mutations in a wide proportion of samples could supplement and enhance the molecular surveillance strategy and improve our understanding of their role in resurgence.

References available on our website.

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Dr Sue Pavord

Vaccine-induced immune thrombocytopenia and thrombosis

The development of vaccines and their roll out are vital to successfully reducing COVID-19 cases and the impact of the pandemic. A rare but serious adverse effect of the ChAdOx1-nCov-19 vaccine has emerged, and in the UK an Expert Haematology Panel was formed to learn from cases and develop guidance for clinicians.

The COVID-19 pandemic, caused by the SARS-CoV-2 virus first encountered in Wuhan in 2019, has devastated populations worldwide. Within months, several vaccines were developed to combat the spread of disease. Widespread roll out of the ChAdOx1-nCov-19 vaccine manufactured by Astra Zeneca began in the UK on 4 January 2021, helping to bring down case numbers and assisting in the easing of some restrictions.[1] The vaccine, approved by the Medicines and Health Regulatory Authority (MHRA) and the European Medicines Agency (EMA), employs a recombinant, replication-deficient chimpanzee adenovirus vector encoding the SARS-CoV-2 spike glycoprotein.[2]

Emergence of vaccine-induced immune thrombocytopenia and thrombosis

As with most medications, side effects soon began to emerge, the most serious of which has been vaccine-induced immune thrombocytopenia and thrombosis (VITT) with the first cases noted in mid-March 2021, both in the UK and Germany.[3,4] Although rare, what brought attention to this condition was the unusual constellation of clinical and laboratory features and the rapidly progressive clinical course, with often devastating consequences. Of particular alarm was the effect this had on young, previously fit and well individuals – a cohort who were hardly affected by the SARS-CoV-2 virus itself.[5]

At five or more days post-vaccination, symptoms, most notably headache, start to develop and progressive thrombosis ensues due to extreme activation of the coagulation system. Platelets and fibrinogen are consumed in the process and D-dimers are greatly increased, to levels above those which would be expected for typical thrombotic episodes. Immunoglobulin G class antibodies to platelet factor 4 (PF4) have been identified in the serum by enzyme-linked immunosorbent assays[6]

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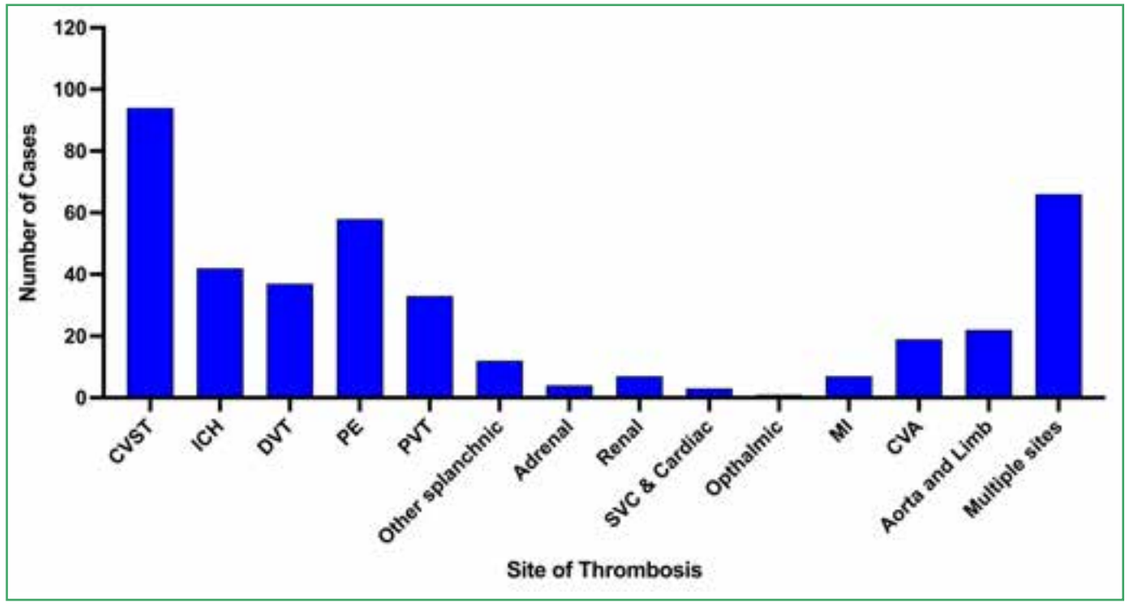

Figure 1: Sites of venous or arterial thrombosis/ thromboembolism.

and the condition has been likened to spontaneous heparin-induced thrombocytopenia (HIT), in that it occurs in the absence of heparin exposure.[7–9]

Pathogenesis and clinical features

It is unclear if particular vaccine components are responsible for this immune-mediated reaction. A multistage mechanism has been postulated, involving the production of PF4 antibodies in a milieu of acute inflammation and vaccine EDTA-induced capillary permeability.[10] PF4 immune complexes activate the Fcγ-receptor IIA (FcγRIIA) and lead to further downstream events involving activation of platelets and monocytes and the release of neutrophil extracellular traps.[11] VITT has also been seen with other vector-based vaccines and errant processing of the delivered spike protein, with unintended splice reactions and production of spike variants, is thought possible.[12]

The thrombotic events are atypical – often occurring in unusual sites and rapidly progressive in nature. Multiple vascular beds can be involved simultaneously, with both venous and arterial circulations affected (Figure 1). While cerebral venous sinus thrombosis (CVST) may dominate the clinical presentation, deep venous thrombosis and pulmonary embolism, portal and splanchnic vein thrombosis and arterial thromboembolic events affecting the peripheral vasculature, myocardial and cerebral arteries also occur. In most cases of arterial thrombosis there is no evidence of atheromatous disease and the arterial bed is otherwise healthy.

Almost half of the cases with CVST develop secondary intracranial haemorrhage from high venous pressure. This can cause midline shift, raised intracranial pressure and risk of coning; many cases have required neuro-intervention including craniotomy, thrombectomy by interventional radiology and catheter-directed thrombolysis.

Expert Haematology Panel and guidance on management

The catastrophic outcomes of VITT led UK haematologists to convene an 'Expert' Haematology Panel (EHP) and hold daily meetings (starting from 22 March) to discuss and learn from cases. These meetings have informed the development of consensus management guidelines based on observations of cases and extrapolation of knowledge of other immune-mediated thrombotic thrombocytopenic conditions, including thrombotic thrombocytopenic purpura and antiphospholipid syndrome, as well as the sister syndrome, HIT. The guidelines are regularly updated as knowledge expands.[13]

The mainstay of treatment is immunosuppression and anticoagulation. Intravenous immunoglobulin is used as a first-line agent to block the Fc receptor and prevent platelet and monocyte activation by the anti-PF4 antibodies. It raises the platelet count and slows progress of the disease. However, the effect can be short lived and plasma exchange may be the preferred option for many patients with aggressive disease. The current recommendation for anticoagulation is non-heparin-based therapies. However, heparin has been used in many cases, particularly those diagnosed retrospectively prior to the recognition of VITT as a syndrome, and does not appear to have poorer outcomes. Argatroban is used when the balance of bleeding and thrombotic risks is precarious, such as when thrombocytopenia is severe, secondary intracerebral haemorrhage is present or neurosurgery is required. When platelet counts over 30 have been achieved, other suitable anticoagulants include fondaparinux and the direct oral anticoagulants apixaban, rivaroxaban and dabigatran.[13]

Ongoing presence of anti-PF4 antibodies can lead to relapses post-discharge, with recurrent thrombocytopenia and risk of thrombosis. Close follow-up is required initially, with twice weekly platelet counts and weekly clinical review.[13] Patients require written information and contact information should symptoms recur. Steroids and rituximab have been used successfully for early relapses, but it can take weeks before the anti-PF4 antibodies disappear.

Going forward

The case fatality rate has declined from 50%, described in early reports, to 25% currently.[10] This is in part attributed to public information released by the MHRA in early April and increasing clinician awareness predominantly through the EHP, leading to both early recognition and treatment. The daily EHP meetings have increased understanding around the condition and facilitate the continuously evolution of the management guidelines as new information becomes available.[13]

Social and psychological support will be essential for these patients and their families whose lives may have been shattered by life-changing mental or physical disability, including loss of loved ones. The COVID-19 pandemic and the battle to fight it has devastated communities and families worldwide, however, VITT in particular has catalysed unprecedented multidisciplinary collaboration in disease prevention and management. Learnings from the UK cases will play a critical role for nations who are beginning to roll out their vaccination programmes and as younger age groups become eligible for vaccination.

On behalf of the Expert Haematology Panel Core Group: Sue Pavord, Beverley Hunt, Mike Makris, Marie Scully and Will Lester.

References available on our website.

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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

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SHARING OUR SUBJECT

Penny Fletcher

National Pathology Week 2021 – 'All together now'

Running from 1 to 7 November, National Pathology Week (NPW) 2021 aims to be a celebration of the amazing teamwork found within and across pathology and other healthcare services.

We want to involve more people than ever in this year's NPW. We hope our members see our inclusive 'All together now' theme as an opportunity to share the importance of their vital work in preventing, diagnosing and treating disease. From activities or displays in your hospital to careers talks in your local school, please take part in spreading the word about pathology this NPW. We have a range of resources to help you start planning and we will be adding to these all the time.

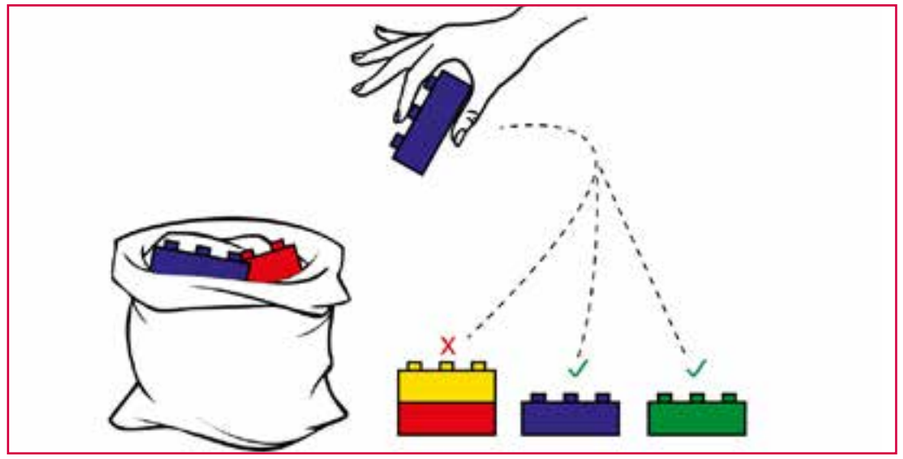
Check out our event organiser resources and our diverse range of activity guides. Published earlier this year, our *Viruses and Vaccines* resources offer creative ways to explore topical themes with schools, families or other hospital staff.

One of the art-science activities in our *Viruses and Vaccines* resource pack.

If you don't have much time, or you don't want to buy in lots of materials, our popular *Choose your own pathology adventure* resource is a great place to start in your search for activity ideas. Watch the video playlist that accompanies this pack; it features activities that explore histopathology, immunology, haematology and virology. Many of the activities on our website work well as part of virtual events; we realise planning in-person events is still an area of uncertainty and risk, so we welcome online events and have a guide on how to make your virtual events a success.

Laboratory experience day for school students held in Aberdeen in 2018.

Illustration of the 'Blood Group Game' activity in our *Choose Your Own Pathology Adventure* activity pack.



There will be more news about NPW 2021 in our round-up article in the October Bulletin. In the meantime, feel free to get in touch with the Public Engagement team if you have questions or ideas – we'd love to hear from you.

Finally, we're excited to announce that in 2022, to celebrate the RCPath's 60th Anniversary, National Pathology Week will run from 20 to 26 June as the College's birthday is on 21 June 2022. Save the date and watch this space for more news on what we're planning!

Penny Fletcher
Public Engagement Manager

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Penny Fletcher

Addressing COVID vaccine misconceptions and myths in communities around the UK

The College has developed a series of short videos to address some of the most common myths circulating about the COVID vaccines, including those spreading in UK communities where English is not the first language.

Following the launch of our *Viruses and Vaccines* resources, the College Public Engagement team worked with eight College members to record a series of videos aimed at diversifying audiences we reach with messages about COVID-19 vaccines. The videos feature messages from pathologists and trainees that address specific myths and misconceptions that exist within their community or ethnic group. Most of the volunteers recorded their videos in English and one or more other languages – there are videos in seven different languages (eight including English), with 27 videos in total, each around one to two minutes long.

Members who expressed an interest in making video messages were invited to suggest the myth or mistruth about the vaccines they wished to address and to outline the audience group they wanted to reach. Video titles include '*Do the COVID-19 vaccines cause infertility?*' and '*How were the COVID-19 vaccines developed so quickly?*' All of the video scripts were written or reviewed by a virologist or microbiologist; the Public Engagement team also had input where appropriate and, where possible, technical terms have been excluded or explained by adding labelled pictures to the video to ensure the videos are accessible to the widest audience possible.

All of the videos are now on our YouTube channel and we are disseminating them via a range of relevant channels and organisations,

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including NHSE/I, health inequality leads within NHS trusts, local council community representatives and social media.

It was fantastic to work with members from all over the UK and from so many different communities to put these videos together. We're grateful to all our volunteers for all of their time in recording and reviewing the videos. Please do share them with any relevant groups or contacts.

Penny Fletcher
Public Engagement Manager

Thadcha Retneswaran

RCPath Book Club – sinking our teeth into *Gulp*

Our third RCPath Book Club took place on Thursday 22 April during Bowel Cancer Awareness Month and featured *Gulp: Adventures on the Alimentary Canal* by Mary Roach.

This virtual event was an opportunity to encourage discussions about our more embarrassing bodily processes. Mary does exactly this in *Gulp*, taking us on a tour of the digestive tract and the less palatable topics that other authors would have otherwise shied away from.

Gulp and its author, Mary Roach.

An international event

Dubbed by the Washington Post as 'America's funniest science writer', Mary is the author of six New York Times bestsellers, including *Stiff: The Curious Lives of Human Cadavers* and *Grunt: The Curious Science of Humans at War*. She was joined by host Jade McAlinn, an advanced practitioner in specimen dissection and RCPath trainee, and panellists Dr Eamon McCarron and Genevieve Bent. Eamon is a chemical pathology trainee in Northern Ireland specialising in metabolic medicine and a trainee representative on the RCPath Regional Council. Genevieve is an Associate Assistant Principal leading science and sixth form in a London secondary school and is the founder of Young, Gifted and STEM (YGASTEM), an initiative that aims to improve the experiences and engagement of young people from ethnic minority backgrounds with STEM subjects.

Zoom has become an integral part of life this past year and this has allowed international collaboration and enabled the College to reach people around the world. In the case of this event, Mary called in from California, while Eamon is based in Ireland. Meanwhile, our audience tuned in from the UK and further afield, including from across Europe, the USA, Canada, the Middle East, Nigeria, Pakistan, India and Myanmar.

The panelists taking part in the Zoom event.

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Between the covers

Gulp provides readers with endless food for thought, an appreciation for the digestive system and an abundance of amusing facts you'll be tempted to share. The panel certainly found the book entertaining and had plenty to chew over – notably, fads and medical pseudoscience such as Fletcherism (Horace Fletcher's concept of extensively chewing food), Mary's fondness for weird and wonderful characters, the role of obsession in scientific enquiry and breakthroughs, and how we can use humour to communicate science to students and lay audiences.

The most pertinent talking point during Bowel Cancer Awareness Month related to a question that Mary poses towards the end of *Gulp*: 'Does distaste slow progress in treating diseases of the bowel? Does the excretion taboo discourage research, discussion, media attention?'

Bowel cancer is treatable and curable, especially if diagnosed early. However, in the UK, over 16,000 people die of bowel cancer each year.[1] It's vital that we all feel more comfortable talking about our health issues, including our poo!

Want to find out more?

If you missed any of the previous book club events, they are now available to view on the RCPath Book Club webpage, where you'll also find information about upcoming events.

We've been honoured to collaborate with some fantastic authors and special guests already, and look forward to continuing to feature many more thought-provoking books, which we hope you'll read.

If *Gulp* has inspired you to initiate conversations about bowel cancer, check out our 'What does your poo say about you?' public engagement activities, which aim to demystify the bowel cancer screening process and demonstrate how pathologists look for early signs of disease.

References available on our website.

Thadcha Retneswaran
Communications Officer

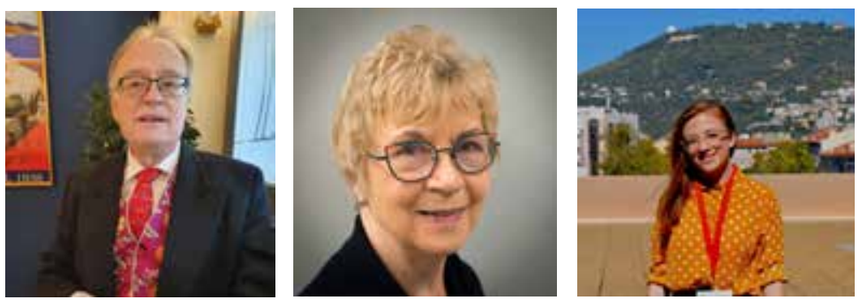
Penny Fletcher

Virtual events on medical ethics explore organ donation, genomic data and inherited disease

Around 260 young people attended online discussion workshops facilitated by College Fellows in May and June, with more events planned for later in the year.

The College delivered two virtual events aimed at secondary school students who are interested in studying medicine (or similar subjects) at university. The 90-minute sessions focused on medical ethics and gave students the chance to consider and share their thoughts on a range of complex issues, including organ donation, consent, and use of medical and genomic data in research.

Both events were facilitated by Professor Mark Wilkinson, a retired College Fellow, Dr Lorna



The panellists for the event at Westcliff school: Professor Mark Wilkinson, Dr Lorna Williamson and Dr Hannah Reilly.

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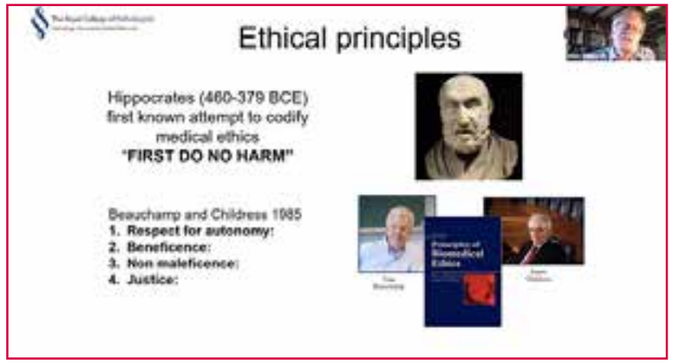

Professor Wilkinson introducing the history of medical ethics.

Williamson, a retired haematologist who was also representing the Human Tissue Authority, and Dr Hannah Reilly, a recently graduated junior doctor.

Student engagement

Loosely based on the College's in-person medical ethics workshop, *Your Body, Your Consent*, the students were presented a series of ethical scenarios and asked to share their opinions via polls. They also had the chance to ask the facilitators questions about the issues themselves and about medical ethics questions that might come up at medical school interviews.

The first of the two events, held by Zoom webinar on 25 May, was exclusively for students at Westcliff school who approached us to run the session after the success of our well-received *Your Body, Your Consent* event at their school in February 2020.

After the 90-minute medical ethics discussion workshop held online in the morning, Professor Mark Wilkinson then delivered two further sessions for the students; the first was entitled '*What is disease?*' and the second was an exercise about HPV vaccination to demonstrate the problem-based learning approach used by many medical schools.

There were 30 Westcliff School students at these online sessions, and we received positive comments from those who participated. One of the students who responded to our feedback questionnaire said: 'Fantastic course. This will be very helpful when writing my personal statement. I learnt about how there are several issues surrounding the online sharing of genetic information as it conflicts with patient confidentiality.'

Encouraging aspiring medics

The second event, held on 2 June, was run in collaboration with the Social Mobility Foundation, who provide opportunities and networks of support for 16–17 year olds who are unable to get them from their schools or families.

All 230 students who joined the webinar from all over the UK are planning to apply to medical school. In addition to the three facilitators recruited by the College, two current medical students who are part of the Social Mobility Foundation's programme also joined the event as panellists. The discussion workshop generated lots of great questions from the students, so many that not all were answered during the event. The facilitators have kindly agreed to provide answers to those that they didn't get to during the event by emailing the Social Mobility Foundation.

Katie Stamps, Aspiring Professionals Programme Manager at the Social Mobility Foundation, gave feedback on the event. 'We are extremely proud of our ongoing partnership with RCPath and would like to thank all volunteers involved for another fantastic medical ethics workshop, which reached over 230 of our aspiring medics across the UK. Medical ethics is an area our students struggle to navigate, however, thanks to the time given by RCPath volunteers, our students have reported feeling more confident in approaching scenarios, structuring their answers and an overall increase in their understanding and knowledge of ethical principles. The event remains one of our most popular workshops and we look forward to continuing our work together in the future.'

Ongoing events

The College is keen to continue collaborating with the Social Mobility Foundation, having first run an event for their students in September 2020. A similar event on medical ethics is planned for November as part of National Pathology Week – this time it will be aimed at undergraduate medical students.

College members are also contributing to their summer 'residential' course in August (to be held on online in 2021) – a pathology careers panel Q&A session will include speakers from the four 'big' specialties in pathology.

We're hopeful we can run our popular medical ethics workshop, *Your Body, Your Consent* in person again at some point in the not-so-distant future. If you are interested in facilitating the discussions at these events when they happen (dates to be confirmed and will be dependent on COVID restrictions), please contact the Public Engagement team.

Penny Fletcher
Public Engagement Manager

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Our work to highlight College priorities across the UK

Janine Aldridge

In this article, Janine Aldridge, Public Affairs Officer at the College, showcases the College's political and stakeholder engagement in the devolved nations, in particular our priorities for the new governments in Scotland and Wales.

The College hosts regional councils, comprising specialty members, for the devolved nations. These councils provide professional leadership in their country and contribute at a national and UK level to the maintenance and development of pathology services and the quality of care that patients receive. The regional councils play a vital role in our engagement with parliamentarians across the UK.

As a medical royal college, one of our aims is to work with governments, associated bodies, opinion formers and decision makers to raise awareness of the critical role pathology plays in providing patient care, research, advancing medicine and devising new treatments to fight viruses, infections and diseases.

In May, the people of Scotland and Wales elected their representatives to the Scottish parliament and Welsh Senedd, respectively. New governments have now taken responsibility for a range of devolved areas, including health services. Engaging with and influencing the devolved governments in Scotland, Wales and Northern Ireland is key to our UK-wide political engagement strategy.

The College manifestos, drawn up by the College Regional Councils for Scotland and Wales, set out key pathology-related calls for the new governments, which we believe will help improve healthcare in each of the countries.

There is some overlap between the two documents – investing in workforce and IT, and infrastructure being vital in both countries, for example. The policy priorities outlined below were welcomed by political and health leaders and, now that that the new governments are in place, we continue to advocate for the vital role of pathologists in prevention, diagnosis and treatment.

Scotland

Alongside the 2021 Scottish parliament elections, The Royal College of Pathologists' Priorities for Laboratory Services in Scotland looks at the key challenges facing laboratory services and calls on the new government to address these areas.

Laboratory services in Scotland involve the work of a huge array of doctors and scientists who play a vital role in the prevention, diagnosis and treatment of illness, with the majority of healthcare interactions involving lab tests in some way. Laboratory professionals undertake research to advance medicine and devise new treatments and have been crucial in the response to the COVID-19 pandemic.

The College priorities for the new Scottish government focus on the following areas:

- learning from the pandemic
- investing in workforce for patients
- IT and infrastructure for better patient care
- staff wellbeing.

Dr Bernie Croal, Chair of the Scotland Regional Council, said: 'The COVID-19 pandemic has once again highlighted the importance of laboratory tests and laboratory professionals within the healthcare landscape. As we emerge from the pandemic, it is vital that such services are reinforced and supported to optimise healthcare recovery, both for COVID-19-related illness and for the inevitable huge healthcare backlog created as a result of the pandemic. Ensuring we have appropriate staff, equipment and IT support to underpin laboratory services is vital.'

Wales

Released for the 2021 Senedd elections, The Royal College of Pathologists' priorities for Wales – 2021 elections is available to download in both English and Welsh.

The College priorities for the new Welsh government focus on the following areas:

- investing in workforce for patients
- IT and infrastructure for better patient care
- improving public health and ending health inequalities
- COVID-19 and pathology services.

The COVID-19 crisis has highlighted pre-existing problems facing rural areas in Wales. Members tell us that this means patients wait longer for a diagnosis in these areas. It can be hard

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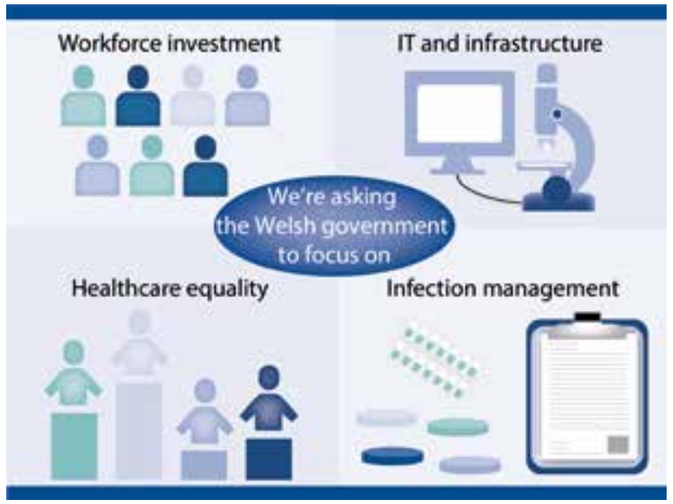
The College priorities for the new Scottish government.

to recruit and retain doctors and nurses who are willing to work in smaller hospitals, which means health boards rely more heavily on agency staff to fill gaps in rotas. This has a knock-on effect on patient care, with patients travelling long distances.

Dr Jonathan Kell, Wales Regional Council Chair said: 'We are calling for increased investment in pathology services, particularly in the recruitment and training of pathologists and scientists. More funded training places are needed to help meet the rising demand for cancer diagnosis, which has been exacerbated by the COVID-19 pandemic.

Further capital investment is needed to roll out digital pathology more fully, so staff can work more efficiently and flexibly. The move to digital pathology needs to be completed and followed through with the right infrastructure.'

We will continue to liaise with parliamentarians, Members of the Senedd and the Health Minister, opinion formers and decision makers to highlight the essential role of pathologists.



The College priorities for the new Welsh government.

Northern Ireland

The next Northern Ireland Assembly election is expected to take place in May 2022, and we will adopt a similar approach to engage with parliamentarians in the run up to the election.

In January, Professor Ken Mills, Chair of the Northern Ireland Regional Council, met with Department of Health officials in Northern Ireland to discuss workforce concerns and pathology transformation.

The College welcomes the progress so far to replace the existing Laboratory Information Management Systems. This is a really important step in the transformation of pathology services in Northern Ireland. The IT system will bring numerous patient benefits and improve pathology services for patients in Northern Ireland – for example by making patients' test results more accessible and improving access to expert advice and opinion on diagnoses.

However, the College recommends more investment in laboratory staff in Northern Ireland, who are under-resourced and under-valued, to enable more effective diagnosis and monitoring. Too much funding is wasted by inappropriate testing or send-away testing due to geographic restraints.

Following the meeting, we have updated our briefing on the workforce challenges facing the pathology specialties involved in cancer services in Northern Ireland.

Over the next year, we will use the points raised in the Scotland and Wales manifestos, and Northern Ireland briefing, to raise awareness and develop relationships with parliamentarians in key health positions in the devolved nations.

Janine Aldridge
Public Affairs Officer

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Introducing the International Committee

Dr Angharad Davies

Our new members of the International Committee discuss their backgrounds and tell us their aims, which include forging links with international pathologists and supporting overseas trainees.

Developing a global strategy

If COVID-19 has shown us anything, it is that medicine and science working collaboratively at an international level is the only way to tackle global health problems, which, like infectious diseases, know no borders. Around 20% of College members are international. As pathologists, we are all part of a worldwide community and the pandemic has served to emphasise the relevance and importance of College's international strategy, 'Pathology is Global', which aligns with the overall College objectives.

The key objectives of the 2019–2022 strategy include providing support for examinations and candidates overseas, promoting capacity-building to improve pathology provision in resource-poor countries, supporting the professional development of international members and trainees, and maintaining high standards of practice overseas. You can read the full 'Pathology is Global' strategy and more about our international work here.

The International Committee is the primary forum for considering, developing, approving and implementing the College's international partnerships and activities. It has been a season for change in the group, with farewells, appreciations and friendly greetings to several newcomers – including myself.

Strengthening international pathology

Dr Maadh Aldouri, outgoing Clinical Director of International Activities, was recently asked what his greatest achievement was during the time he spent in the role. He responded: 'I have a long and happy reel of memories from my years of work with the College and I look back with affection and pride over many aspects. If I must articulate one, I will probably say outreaching for international College Fellows and pathologists, strengthening their engagement with the College, and supporting them in their training and pathology services.'

This reflects Dr Aldouri's unwavering commitment and contribution to the role and I extend my sincere thanks for the excellent work he has done on behalf of the College.

Professor Ismail Matalka was recently appointed as the new Clinical Director of International Activities. While new to this appointment, Professor Matalka is no stranger to the overseas work of the College, bringing with him a wealth of experience in his previous roles as Country Advisor for Jordan and International Regional Advisor for the Middle East and North Africa (MENA) region.

He is also an exam coordinator for Part 1 and Part 2 FRCPath exams and was highly influential in the first expertly run virtual International Pathology School event in January, held in association with Jordan University of Science and Technology. The event was attended by over 100 medical undergraduates from across the MENA region. As one of its guests, I was extremely impressed by the students' enthusiasm and knowledge.

With the dedication of the committee members and the leadership that Ismail will deliver, I look forward very much to supporting the group and its work over the next few years.

Dr Angharad Davies
Vice President for Learning

Our new Clinical Director of International Activities

My background

We begin in Jordan, where I completed my undergraduate and postgraduate training before continuing my pathology training in Glasgow, Scotland. During my stint in the UK, I became a Fellow of the College in 2000 and went on to obtain the Certificate of Completion of Specialist Training (CCST) a year later. As my career developed, so did my special interest in gastrointestinal and liver pathology, which is reflected in my 71 publications in peer-reviewed journals. Medical education, curriculum development, assessment,

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Professor Ismail Matalka

and institutional and programme accreditations are also areas that excite me, so receiving the College's Achievement Award in education last year was truly an honour.

Maintaining global links

I have been a longstanding advocate of the College's International Committee and its networks. The international work of the College is a familiar and happy place – a home of sorts! My firm belief is that Fellows practicing overseas should maintain strong links and be involved with the College. This belief fired my desire to be an integral part of championing the importance of keeping up to date with high standards of practise, training and assessment.

The perfect opportunity for me came seven years ago when I took up the role of Country Advisor for Jordan, which opened the door to progress to the role of International Regional Advisor for the MENA. In February, when I accepted my current appointment, I felt very fortunate to have the chance of bringing my experience, networking and knowledge of the College's processes to the forefront to best serve the overseas membership and College strategy, 'Pathology is Global'.

My key objectives

My approach to the new role will be to integrate the incredible work that has already been done across the different regions. Together with the International Committee members, country advisors, partners and the wider team, my hope and commitment to the role will be to deliver on five key objectives:

1. to outline strategic action plans and a roadmap for the International team over the next three years
2. to increase the visibility and presence of the College globally by updating Fellows on the College mission and strategic plan, promoting excellence in the practice of pathology at an international level
3. to increase and enhance the opportunities for overseas medical graduates to access and apply for the Medical Training Initiative (MTI) and International Trainee Support (ITSS) schemes, and for undergraduate medical students to attend International Pathology Schools (structured international pathology taster webinars)
4. to raise awareness of College examinations and encourage overseas trainees to sit for the examinations, particularly with the adoption of the TestReach platform for written and video conferencing for oral FRCPath Part 1 exams
5. to advance the standards of practice of pathology globally by promoting the culture of quality and benchmarking, and the shared experience between fellows regarding digital pathology practice and utilisation of artificial intelligence.

Professor Ismail Matalka
Clinical Director of International Activities

Professor of Pathology
Jordan University of Science and Technology

Professor Kikkeri Naresh

Establishing international programmes

My background

Being appointed International Regional Advisor for the Americas last November was a real privilege. It also marks the year I moved to the United States to take up the roles as Section Head and Professor of Pathology at the Fred Hutchinson Cancer Research Centre and Professor of Pathology at the University of Washington in Seattle. You could say it was a big year!

Before the move across the pond, I spent 17 years at the Hammersmith Hospital and Imperial College London, where I now continue as a Visiting Professor at the Centre of Haematology, Imperial College London. Prior to living and working in the UK, I worked for many years in several premier institutions in India.

Areas of interest

I am a haematopathologist, an expert in the diagnosis and translational research of haematological malignancies – especially lymphoma and bone marrow pathology. In this capacity, I conduct laboratory studies to improve patient care.

Another aspect of my work that I am passionate about is the position I hold as an international expert on the current editorial board for the upcoming *WHO Blue Book on Haematolymphoid Tumours (5th edition)*.

My translational research is focused on the biology of lymphoma – including its genome, lymphomagenesis and microenvironment, and the development of new algorithms to improve lymphoma diagnosis – and biomarkers that contribute to precision medicine. As well as my research, I am also interested in lymphoma-causing viruses, blood stem cell transplantation and plasma cell myeloma.

I am keen on mentoring and training junior colleagues and students from across the globe – both in diagnostics and in research. I also spend a good proportion of my time in delivering seminars and lectures. All these have contributed to developing a wide international network.

Key aims

I am a strong believer in global medicine and pathology. The prospect of being able to deepen my commitment to global pathology and to actively promote this mission is what drew me to work with the College's International Committee in pursuing this vision.

Establishing collaborative academic training programs between the UK and countries in the Americas is something I intend to explore. I will network with Fellows of the College across the region to capture their views on developing and maintaining high standards of pathology education, which are goals I will be aiming to achieve over the coming years.

Professor Kikkeri Naresh
International Regional Advisor for the Americas

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Professor Maysa Al-Hussaini

Building collaborative links in the MENA region

My background

There are two countries in this world that have had a significant impact on nurturing the pathologist in me – Jordan and Ireland. I completed my undergraduate studies at the University of Jordan, School of Medicine. I then joined the residency program at the University of Jordan to pursue a higher specialisation in pathology, earning my degree from the Jordan Medical Council. I went on to join the Royal Victoria Hospital Trust in Belfast, Northern Ireland for further training opportunities, where I received my FRCPath accreditation, and became a member and subsequently a Fellow of the College.

After further training in neuropathology and dermatopathology, I joined the University of Jordan, School of Medicine as an assistant professor and consultant at the Department of Pathology, Laboratory Medicine and Forensic Pathology. Then in 2006, I joined the King Hussein Cancer Centre, where I practise pathology today.

Supporting pathologists

Throughout my career, I have been especially eager to reach out to colleagues and pathologists in training, to help support them to attain their dreams in training abroad and to acquire higher and prestigious degrees like the FRCPath, and to undertake specialisation and subspecialisation.

The Royal College of Pathologists, in turn, has invested in its outreach programme, emphasising on the values of diversity and inclusions, hence the motto 'Pathology is Global'.

I believe that I can act as a liaison between the College and various pathologists to advance pathology in the MENA region. To this end, I envision building bridges of trust and collaboration between the Fellows practicing overseas in the region and the College. I also hope that, by arranging different activities, enhanced training for both practising and in-training pathologists can be achieved. Additionally, advising pathologists in the region on the various resources available at the College can also help enhance their career and the practise of pathology. Directing some activities to undergraduate medical students will encourage pathology as a career choice to many outstanding students.

Professor Maysa Al-Hussaini MD FRCPath
International Regional Advisor for the Middle East and North Africa (MENA)

Consultant Histopathologist, Cytopathologist and Neuropathologist
Department of Pathology, Laboratory Medicine and Forensic Pathology, King Hussein Cancer Centre, Amman, Jordan

Fortifying regional networks

My background

Sixteen years ago, I moved to the UK to complete my foundation and postgraduate training. After I had graduated from the University of Mosul, I completed my histopathology training in London and was awarded the Certificate of Completion of Training (CCT) in November 2016. I went on to become a consultant breast and skin pathologist at the University Hospitals of Leicester where I work today.

I consider myself lucky to be in my current position and understand that, although someone might have a burning desire to become a pathologist or to advance professionally, their opportunities to do so may be limited and harder to come by.

By being actively involved as a country advisor, the UK diaspora group has provided me with a place where I can and have been able to reach out to those less able to get quality training and education.

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Dr Omar Qassid

Hopes for the committee

My hopes as International Associate Regional Advisor, in collaboration with Maysa Al-Hussaini, the International Regional Advisor, are to fortify the existing network in the region. This will be achieved by appointing new advisors in under-represented countries, particularly in the western MENA region, and to work closely as a team with current country advisors.

Our goal is to establish a formal collaboration between the UK and the local training centres to support the trainees and the training curriculum. An important part of my role over the next three years is to encourage pathologists and raise their awareness of the schemes offered by the College, such as the ITSS for histopathology and medical microbiology, as well as the Fellowship exams.

Dr Omar Qassid
International Associate Regional Advisor for the MENA

Dr Ranganathan N Iyer

Developing pathology in South East Asia

My background

I have worked as a consultant in microbiology, infections and infection control in Hyderabad, India, for over 30 years. I am delighted with this opportunity to work for the Royal College of Pathologists as an Associate Regional Advisor for South East Asia. My hopes are to help strengthen laboratory services in the region with the aid and cooperation of our colleagues, enhance training, and spread awareness of the role that pathology plays in medicine and patient care.

An important part of increasing the viability of the College could be through directed CME programmes and webinars, training sessions for laboratory personnel and trainees in pathology, and having one-to-one sessions with clinical colleagues, which would play an important part in raising the College's profile internationally. Together with Dr Kedar Deodhar, the International Regional Advisor for South East Asia from Mumbai, India, we hope to reach out to our colleagues in the region and take forward the goals of the College.

Dr Ranganathan N Iyer
International Associate Regional Advisor for South East Asia

Consultant Clinical Microbiology, Infection Control Gleneagles Global Hospital & Rainbow Children's Hospital, Hyderabad, India

Dr Hebah Ali

Understanding international challenges

My background

Every story has a beginning. Mine, as a doctor, starts in Jeddah, Saudi Arabia. When I was five, as I vividly recall, my dad visited the hospital for his slipped disc. I promised him then that one day I'd become a doctor to 'heal his back'. Well, keeping up with that little girl's promise, I went on to attend medical school at the University of Juba, Sudan, and earned my medical degree in 2007. But what brought me to the College?

I was awarded the FRCPath in 2015 and prior to that, I trained in histopathology in Saudi Arabia and the UK. Following subspecialisation in haematopathology at the University College Hospital, London, I am currently practising as a consultant haematopathologist at the Haematological Malignancy Diagnostic Service in Leeds.

As an international trainee medical graduate, I was GMC-registered through the College's sponsorship scheme and I entered into the Specialist Register via the Certificate of Eligibility for Specialist Registration (CESR) route.

After a journey spanning three continents, I see the potential and understand the challenges international doctors face sitting exams or relocating to the UK. So, I want to make a difference in doctors' lives, helping them secure the FRCPath and obtain specialist registration. Directly or through courses, I share my experience and mentor both overseas and national trainees.

My passions and aims

I have been volunteering and serving on the ITSS programme since 2018. Being a mentor and working with the wonderful International team have been rewarding. I take as much pride in the mentee's achievements as my own. So, taking up this lead role has been a calling as well as a privilege.

I am passionate about partnering UK and international training bodies by streamlining the sponsorship scheme. I aim to advocate for FRCPath internationalisation by supporting overseas histopathologists sitting the exams, to strengthen

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the College engagement with its international members.

And as for my dad, he is doing great! Even though I haven't become a neurosurgeon, he remains proud.

Dr Hebah Ali
Education Lead for the Sponsorship Scheme and International Trainee Support Scheme (ITSS) Histopathology

Dr Anan Ghazy

Mentoring international trainees

My background

I currently work at Imperial College Healthcare NHS Trust as a consultant medical microbiologist. I joined the trust after graduating in Egypt. Having been trained overseas, I can relate to how difficult it is to work in a completely different environment with new systems, as well as adapting to the customs that come with living in a new country. My own experience has made me very passionate about helping others who want to pursue a career in pathology in the UK and easing the challenges that can arise from undertaking the FRCPath exams.

My projects

It is this passion that led me to take on my first role supporting the international work of the College. As a volunteer mentor for the ITSS medical microbiology programme, I discovered through my active engagement as mentor for the scheme that, because of the differences in the healthcare systems here and overseas, individuals who wanted to take the FRCPath Part 1 and 2 exams found it a challenge to pass. For this reason, I have dedicated my time to tailoring resources, making them available to everyone. I mentor the trainees to ensure that they feel supported, and help to develop and improve their skills necessary to pass the exams. I achieve this by providing an overview of the medical microbiology curriculum and how specialty training is structured and delivered in the UK.

Another route available to international graduates is the MTI. As the lead of the MTI scheme, I organise the supervision needed for international trainees to come and work in the UK for up to 24 months. This is a great opportunity to develop their careers further if they choose to.

We support international training graduates by securing registration with the General Medical Council (GMC) to allow them to come to the UK and gain vital experience within the NHS. By being a part of this scheme, one is adhering to the College's international strategic objective, which is to raise standards internationally while fostering an environment where one can discuss, exchange and collaborate internationally.

Dr Anan Ghazy
Education Lead

Medical Training Initiative Scheme and International Trainee Support Scheme Medical Microbiology

Dr Wale Atoyebi

Innovating training programmes

My background

I am a consultant haematologist and honorary senior clinical lecturer with an interest in red cell disorders. I am based in Oxford, where I also undertook my postgraduate training in haematology after completing my primary medical training in Nigeria. In another of my roles, I lead one of the ten newly designated NHS England Haemoglobinopathy Coordinating Centres.

In 2004, when I was Oxford Deanery's Trainee Programme Director for haematology, I initiated the international haematology training programme with the Royal College of Physicians' MTI scheme and Post-Graduate Institute of Medicine of Sri Lanka. It has paved the way for several haematology trainees to spend two years in haematology training in Oxford, before going on to take up consultant posts in Sri Lanka.

Running teaching and lecture programmes in Sri Lanka in the past and, currently, examining for both the FRCPath and Sri Lankan post-graduate diploma in haematology has allowed me to maintain close connections and support trainees in the country.

The College has an excellent history of haematology collaboration through a network of Fellows and committee members who are strategically located worldwide.

Membership of the international committee provides me an opportunity to contribute to the development of new international partnerships, especially in sub-Saharan Africa, but also with professionals and groups – e.g. the British Society for Haematology – working in haematology in the UK to enhance the College's overseas work.

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Future vision

The ARISE programme is a collaborative sickle cell disease project, involving staff exchanges between nine EU institutions and non-EU countries, including the USA, Lebanon, Kenya and Nigeria. When I contemplate the coming years in my role on the International Committee, my vision is this: to build further on the excellent foundations of the first two years of the ARISE project – which the College participates in – by developing innovative approaches to the programme, in light of the limitations imposed by the COVID-19 pandemic.

Dr Wale Atoyebi
Clinical Lead
African Research and Innovative Initiative for Sickle Cell Education (ARISE) project

Virtual, but international: 'CESR in Histopathology' went global!

The CESR in Histopathology course gives attendees the opportunity to discover more about the CESR route and this year's course was an international event with attendees from 27 countries. Read on to find out more about CESR and to hear reflections from presenters and attendees.

Dr Hebah Ali

Ms Joanne Brinklow

Ms Tanna Hawkins

This year's CESR in Histopathology course, held in February, was the third time we have run this one-day event. The course provides guidance for doctors considering the Certificate of Eligibility for Specialist Registration (CESR) application in histopathology and is generously supported by Health Education East of England and RCPath. The online course was very well received and a valuable, stimulating, enjoyable and 'well spent' Saturday for over 200 attendees from 27 different countries.

Developing knowledge and skills

Every year, around 60 doctors complete an approved training programme in histopathology, leading to the award of a certificate of completion of training (CCT). This means their names will be added to the General Medical Council (GMC) Specialist Register and they can be appointed to a substantive consultant post in the NHS. But doctors don't always go down this route. Many doctors in staff and associate grade roles have, through their experience, developed valuable knowledge and skills equivalent to the requirements of the curriculum for their specialty. A CESR offers a way for these doctors to apply for entry to the specialist register. Doctors are eligible to submit a CESR application if they have a specialist medical qualification or six months' training in their specialty. This can be undertaken anywhere in the world. Before 2010, the CESR route was sometimes referred to as Article 14.

CESR applications are usually supported by a large amount of documentary evidence. Through these documents applicants aim to show that they are competent in all the areas set out in their specialty curriculum. The online course was a great opportunity for making contact with the GMC specialist applications team members who handle the initial CESR applications assessment, and three team members – Jessica Knot, Jessica Betts and Elesha Lafferty – attended to support the event. They delivered a useful overview on the application process as well as interactive sessions for detailed guidance on the evidence bundle submission.

CESR is a robust process that includes, in addition to the initial application to the GMC, an assessment by at least three RCPath Fellows in the relevant specialty and a recommendation from the College to the GMC about whether or not the applicant is suitable for entry to the Specialist Register.

Dr Neha Dalal, Deputy Chair of the RCPath Credentials Panel, gave an amazing talk on the College's perspective of the assessment. The session was moderated by Dr Sarah Lower, a CESR assessor and Histopathology Training Programme Director for East of England. The delegates found the interactive session 'very special' and said it 'helped to resolve a lot of doubts about the CESR process'.

The CESR route to histopathology

Joanne Brinklow, Director of Learning at RCPath, updated the audience on developments in histopathology training and highlighted more about the CESR route. Here, she provides an overview of her valuable session.

I was honoured to be asked to return to present at the CESR histopathology course in February. It was a very different type of event to the previous one held in person in March 2019 in Harlow, but no less successful.

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Dr Vasi Sundaresan

This time, I was able to update attendees about the progress that had been made with the development of the new histopathology curriculum. This was important because CESR applicants are judged against the current curriculum standards when making their application to the Specialist Register, so it is crucial for potential applicants to be able to anticipate these changes. The good news is that the GMC has introduced flexibility about which curriculum applicants are judged against when colleges are in the process of implementing new curricula.

After an update on the curricula, I then explained the College process for reviewing and making recommendations about CESR applications. This process is overseen by the Training team in the College, which reviews and returns applications to the GMC within 36 working days. During this time, the views of three College Fellows in the specialty are obtained and agreement sought about whether or not the application meets the standard for entry to the Specialist Register.

Applicants were shown how the number of CESR applications in histopathology had increased over the last few years. The number of successful applications is also very much on the rise – in no small part attributable to this course and others like it, I am sure.

I also discussed some of the common reasons that applications were turned down, including no evidence of a specialist qualification, no evidence of competence in paediatric pathology or neuropathology, lack of training in liquid-based cytology and autopsies, and no evidence of teaching.

Hopefully, all the information shared at this event helped CESR applicants to make successful applications, enabling them to apply for consultant posts in the NHS. I am very much looking forward to the next course.

An international event

What was special about this year's event was its international trait. It was a true celebration of diversity with a significant number of international medical graduates (IMGs) joining from overseas. As they are early in their CESR journey, Ms Tanna Hawkins, the RCPath International Officer, enlightened them on two of the College's schemes for IMGs. Here she shares more.

The International team participated in this year's CESR event. As this was virtual, many IMGs were able to attend. The International Education Officer gave a two-hour presentation on the College's Sponsorship and International Trainee Support Scheme and held a live Q&A for participants to ask questions about the application process and to better understand the schemes.

The session was very successful and was attended by over 100 IMGs who all plan to progress further in their careers as pathologists with the support of the College.

The day included informative presentations from GMC and RCPath speakers.

Feedback on the course

The delegates were looking for guidance about the preparation and the team of mentors provided much-needed help by sharing their experience, moderating the breakout sessions and answering over 450 questions during the day! We are grateful for our panel of successful applicants who are now practicing as consultants all over the UK – Dr Aiman Haider, Dr Geeta Kurlekar, Dr Anu Gunavardhan, Dr Zain Mehdi, Dr Sonal Kulkarni and Dr

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Sona Appukutty – for encouraging this form of engagement.

We are thankful for the team in the Princess Alexandra Hospital who helped us to develop this event, volunteering time and effort to facilitate it. Organising the course was a huge undertaking, but we all found it to be an extremely rewarding event. We are proud of its success. We are elated with the very positive feedback.

Feedback from attendees was very positive, with one attendee commenting: 'The course was very informative on a journey that one might consider with trepidation if one is not informed well and if the information one receives is fragmentary and frequently contradictory. The course enlisted the right focus and very appropriate essaying of areas which might seem especially daunting.'

Another said: 'Beautifully packaged and seamless course experience with timely mails and reminders. It has made an otherwise overwhelming prospect seem possible and doable. I consider myself truly lucky for coming across the course and earning this rich treasure trove of information.'

We wish the applicants all the best and look forward to the next CESR course in 2022.

Dr Hebah Ali
International Education Lead (ITSS Histopathology & Sponsorship)

Ms Joanne Brinklow
Director of Learning

Ms Tanna Hawkins
International Education Officer

Dr Vasi Sundaresan
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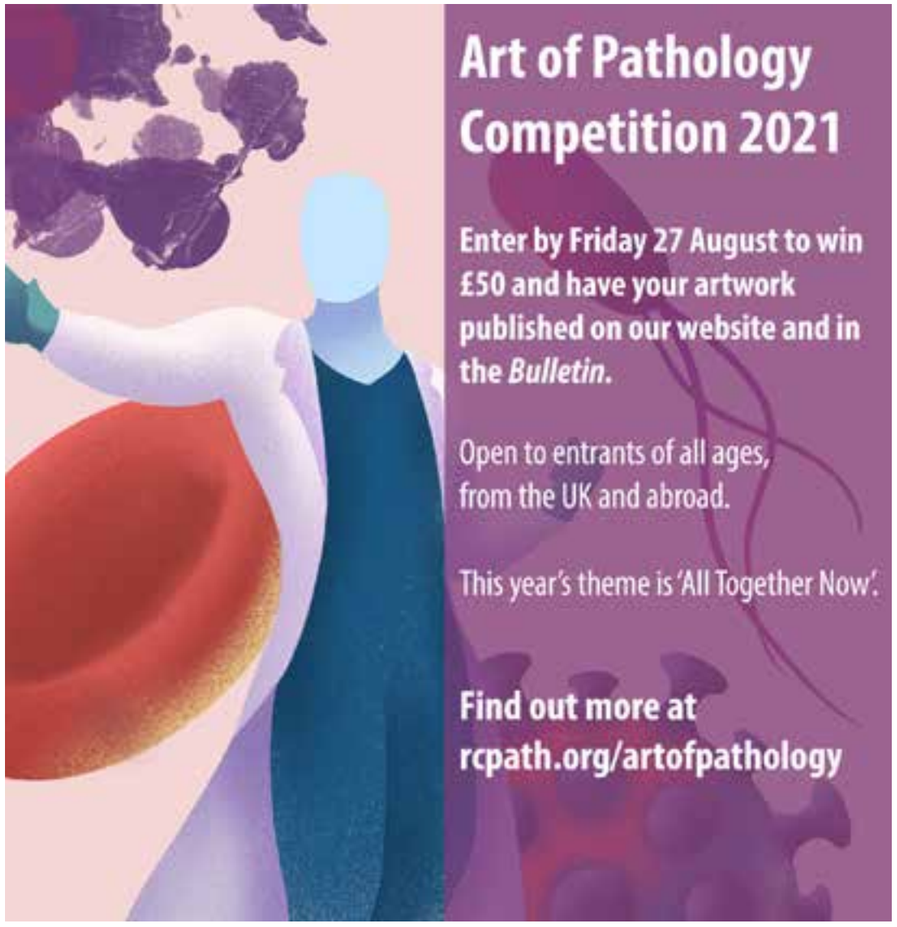

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Making chemical pathology more accessible in medical schools

Clinical biochemistry plays a pivotal role in medical school curricula but chemical pathology is rarely covered in its own rights as a separate module. In this article, a final year medical student and a clinical biochemistry teacher share their suggestions for increasing exposure to chemical pathology based on their experiences.

Miss Asha Rattan

Dr Farhan Ahmed

A student's perspective

By Miss Asha Rattan, a final year medical student

I am a final year medical student and, as I am fast approaching my first working years as a doctor, I have reflected on where my confidence lies and which areas were perhaps overlooked as part of the medical course. One specialty in particular comes to mind – chemical pathology/metabolic medicine.

Like most other medical schools' curricula, our teaching was split into pre-clinical and clinical years. During our pre-clinical years, we had two teaching blocks – Metabolism and Mechanisms of Disease – in which a few lectures covered some of the basics of metabolic medicine and chemical pathology. Our limited exposure in a hospital setting included an observation of one metabolic medicine clinic.

What became apparent, during our clinical years, is that all our rotations contained only some elements of chemical pathology. The understanding and interpretation of blood tests is fundamental in all specialties and helps each clinician diagnose and guide future management. Chemical pathology broadens our analysis of blood test results and helps with identifying common pathologies, as well as rare conditions that can only be detected with knowledge around the subject. Greater experience could raise awareness of these pathologies and lead to quicker diagnoses and improved patient outcomes.

For these reasons, I believe our limited exposure to chemical pathology during medical school should be addressed. In addition to further lectures and ward-based teaching, I would suggest having a few days in a pathology laboratory. This would lead to a deeper understanding of the methodology used and the processing of samples. Increased exposure would provide us with an appreciation of the chemical pathology field and improved analytical skills for investigations, which can be applied to any specialty. This would be very beneficial for our future practice and improve our patient care as doctors.

Additionally, owing to limited exposure to this specialty as an undergraduate and junior doctor, a career in chemical pathology is something one is not given the opportunity to fully consider. In the UK, opportunities to specialise in chemical pathology only arise after foundation years, which can be restrictive when considering a career in this field. In addition to further experience at medical school, it would also be valuable to include an option for a rotation in the foundation year programme.

This opportunity would be useful for budding chemical pathologists, or for doctors who would find a greater understanding of chemical pathology beneficial for their future medical specialties.

A clinical tutor's perspective

By Dr Farhan Ahmed, a chemical pathology and metabolic medicine consultant and clinical biochemistry teacher

Seeing the blank faces of medical students when I introduce chemical pathology and metabolic medicine as part of their clinical course is something I am well used to.

Generally, chemical pathology is taught across the curriculum in a somewhat pathological manner and therefore is under-represented as a specialty in its own right. In most medical schools across the UK, the curriculum is taught according to the systems in the human body, such as cardiovascular, respiratory, reproductive and so on. While this is an effective methodology, this can place chemical pathology on the back foot.

Chemical pathology, or clinical biochemistry, is a background theme in all the taught systems of the human body and is often taught by specialists of the systems (such as cardiologists, chest physicians, gynaecologists and so on). As a result, some practical aspects of clinical biochemistry can be overlooked. For example, a cardiologist may touch upon serum troponin during a lecture on heart attacks, but might not discuss the deeper aspects of the troponin results, such as false positives or

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negatives, cross contamination, sample stability, etc., which can have further implications on patient diagnosis and management.

Often, students tend to rely on test results, thinking of them as merely numbers on a chart rather than thinking about how the numbers are produced. For example, some of the blood tests are produced by immunoassays, which are antigen–antibody reactions. However, external factors, such as keeping pets, can interfere with immunoassays and produce spurious results. With each test result, a reference range is provided. If the concept of how the reference range is derived is not clear, then some students will think any number outside the range is abnormal. Yet, in fact, 5% of the population's test results are outside the reference range but are normal for that individual.

Some medical schools in the UK, such as Oxford University Medical School, teach laboratory medicine as a separate module taught by specialists. The ethos for this module is to bridge the gap between patient care and the basic medical sciences. The clinical biochemistry aspect of different systems of the human body is covered by a chemical pathologist and delves deep into not only the clinical aspects, but also the pragmatic elements, including tips and tricks of the trade. Feedback from students who have taken this module has been excellent. One student came up to me to tell me that they can now interpret test results beyond simply the numbers.

Clinical biochemistry is a pivotal part of the medical school curriculum and it would be encouraging to see a more defined contribution from chemical pathologists to making this more accessible to students.

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Learning styles of histopathology trainees in the UK

Dr Emma Short

Dr Ali Hussein

To acquire the broad skillset required to become a pathologist, trainees must learn vast amounts of information. An awareness of different learning styles can help to enhance this process.

As healthcare professionals, we continually learn throughout our working life. The greatest acquisition of knowledge and skills often occurs at the beginning of our career, when we make the step onto the histopathology training pathway.

The training programme typically involves formal teaching sessions, informal teaching through interactions with colleagues and senior staff, self-directed learning and direct exposure to the routine clinical workload. Trainees are required to learn a significant volume of factual information, to become experts in pattern recognition and to acquire a broad spectrum of practical skills to ensure they qualify as safe and competent pathologists.

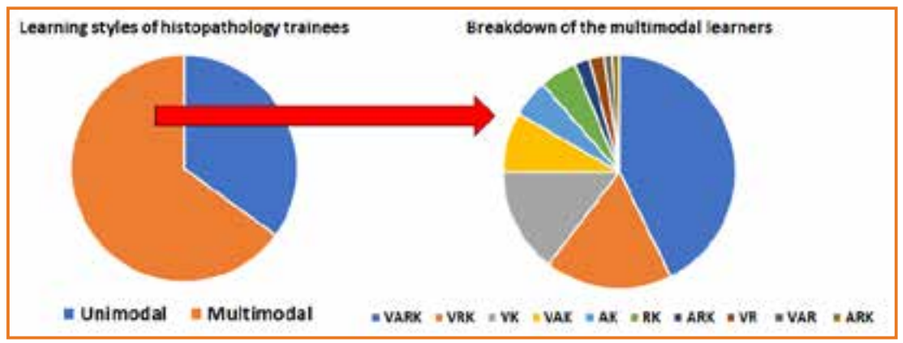

Figure 1: Learning styles of histopathology trainees in the UK illustrating the analysis of multimodal learners.

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Dr Matthew Mort

When planning and delivering training programmes, it is important to consider the different learning styles of trainees and to ensure that the provision of education is carried out in a way that is most likely to fulfil the learner's needs.

Learning styles

An individual's learning style has been described as their 'characteristics and preferred ways of gathering, organising and thinking about information',[1] or as the 'characteristic cognitive, effective and psychosocial behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment'.[2] There is some evidence that an individual's learning style may change as they develop and mature. Furthermore, learners may need to adapt to one or more styles based on the requirements of their profession.[3]

There are many different models of learning styles described throughout the literature, one of which is known as VARK. VARK categorises learners based on the primary sensory modality in which they prefer to have information presented to them.[4] These categories are:

- visual (V) – learners prefer to view information as drawings, diagrams or flowcharts
- auditory (A) – learners learn best when they hear information being presented to them, for example through lectures or discussions
- reading/writing (R) – learners prefer to see new information in writing via text or tables
- kinaesthetic (K) – learners assimilate new information most efficiently when it is something that they can manipulate with their hands.[5]

Within the VARK model, learners may be primarily unimodal in their learning preference, using just one of the four modes, or multimodal – be that bimodal, trimodal or quadrimodal. To determine their learning style, individuals are required to complete a simple questionnaire that consists of 16 multiple choice questions.[6]

The aim of our study was to characterise the learning styles of histopathology trainees throughout the UK and to consider the implications this might have when designing training programmes.

Our study and its outcomes

Ethical approval for this study was given by the Cardiff University School of Medicine Ethics Committee. All registered histopathology trainees throughout the UK were contacted via email through a mailing list from RCPath (n=547; ST1: 152, ST2: 118, ST3: 106, ST4: 84 and ST5: 87). Participants were provided with a link to the VARK questionnaire.

A total of 135 responses were received (response rate: 25%). Of these, 69% were female, 29% male and 2% preferred not to say. The female to male ratio in the total trainee cohort is not known. The respondents were spread across all training stages: ST1: 35 (26%), ST2: 24 (18%), ST3: 25 (19%), ST4: 21 (16%), ST5: 21 (16%) and ST6+: 9 (7%).

Interestingly, 65% of participants were multimodal (M) learners and, within that cohort, 41% were quadrimodal, using all four sensory modalities. Within the M subgroup, the remaining individuals exhibited a range of learning styles: 17% VRK, 14% VK, 8% VAK, 5% AK, 5% RK, 2% ARK, 2% VR, 1% VAR and 1% AR (Figure 1).

For the unimodal learners, who represented just over a third of respondents (35%), 19% were V, 13% were A, 23% were R and 45% were K.

There was no significant difference in learning styles depending on gender or stage of training ($p>0.05$).

Implications for training

The striking finding from this study was that the majority of trainees are multimodal learners, who generally use all sensory modalities. Taking this into consideration, it would be desirable for training programmes to deliver educational activities in a way that fulfils all these parameters. For example, teaching sessions could include a mixture of showing images of slides (V), lectures and discussions (A), slide presentations using text (R), and handouts with text and images (R and V). Hands-on experience is also vital (K), for example doing cut ups and post mortems.

Summary

An individual's learning style takes into consideration their preferred way of receiving and processing new information. This study indicated that many UK-based histopathology trainees are multimodal learners. It is important that training and education programmes understand the learning styles of their trainees, since this will help to ensure that information is delivered in the most efficient way and will enhance the learning experience of participants.

References are available on our website.

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Dr Judith Fox

Teaching undergraduate pathology during COVID-19 – sharing experience from our medical school

With social distancing measures in place during the pandemic, traditional in-person teaching has not been possible. Teaching staff from the University of Bristol explain their new online methods.

Teaching during the pandemic

The last year has been a strange time for medical schools. Students have had a very different experience getting onto wards and seeing patients compared with previous years. This is also true for those of us delivering the teaching. Over the last 12 months, most of us will have used various methods to provide teaching to our potential future pathology registrars and I will share our experience at the University of Bristol in this article.

At Bristol Medical School, our clinical teaching is spread over eight different hospitals, rather than being concentrated in one main teaching hospital. We do not have a separate pathology course, but, as well as sessions in lower years, pathology tutorials using case-based learning are delivered throughout year three. Students in different hospitals have different timetables based on their clinical attachments so the logistics of this are challenging, even under pre-pandemic conditions.

In the first wave, everything happened so fast that we had very little time to plan, and as many of the tutors were called back into the NHS, they were unable to deliver live sessions. The advent of social distancing, as well as some students needing to self-isolate and not being able to move from ward to teaching rooms, made this process challenging even when the students were able to return to the clinical environment.

Online resources

There are several different options for delivering course material under these circumstances (Figure 1).[1–3] These include online e-learning modules or videos and synchronous online sessions. Once the students returned in September, we also had the option in some hospitals of delivering in-person sessions to small groups while maintaining social distancing. For some of our academies, this meant that they were able to deliver all of their sessions in person, but for others we had to come up with different solutions.

While in-person teaching is clearly the gold standard, this was not possible during the first wave. Since then, it has only been possible in smaller groups because of social distancing measures. Some tutorials have been run with a hybrid setup, with some students online and some present in the room, but this requires the correct equipment and is more difficult for the tutors. Asynchronous material is appreciated by the students as they are able to learn in their own time, but this means that they miss out on the interaction with the tutor and do not have the same opportunity to ask questions in real time, although they are able to contact tutors via email.

There are also excellent online resources available for the students, including the list of undergraduate resources provided by the RCPath.[4] We have found the best compromise for much of the last year has been synchronous online sessions, with recordings of sessions and online modules as a backup.

Key criteria for e-learning

When using online platforms for delivery of any teaching, there are various criteria that need to be considered:

- ease of connectivity
- interaction with students – using a variety of tools to engage with students, e.g. chat function and polls
- ability to see presentations – ensuring students are able to download the presentation, share the screen, use the chat function, etc
- access to university platforms for NHS staff.

The increasing interactivity of online platforms is invaluable in the development of sessions that are engaging for distance learning. Many of the platforms currently available have built-in polls, which are sufficient for students to practice single best answer questions, but work less well when, for example, selecting suitable blood tests or suggesting differential diagnoses at the start of a case.

Interactivity varies from platform to platform and many polls either cannot be set up in advance, such as the Blackboard platform, which many universities use as their main learning management system, or only give the students the ability to pick one option. The two main platforms that we have used over the last year are Blackboard Collaborate and Microsoft Teams, although we also plan to trial Zoom over the next few months.

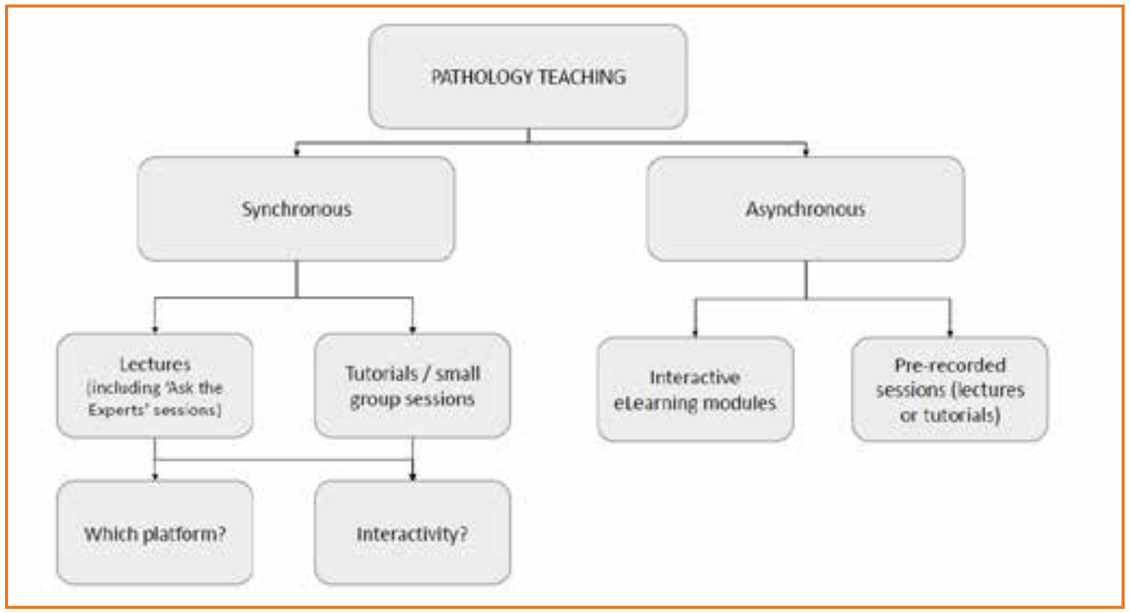

Figure 1: Options for delivering remote learning.

Student engagement

Online interactions have to take into consideration the fact that many students have to log into sessions from areas such as libraries and thus cannot speak, so either the chat function or interactivity are necessary for the session to be anything other than a didactic lecture.

Other interactivity options are available, such as TurningPoint and Mentimeter. These are very useful as they allow the students to participate in a much more varied way, including questions with multiple answers, which is where I believe the added value of online sessions will develop in the future.[5] The students are able to submit answers using their phones, which allows them to continue to view the presentation on a computer at the same time and also lets several students sitting around a single terminal (such as in a teaching room of some kind) participate individually. I have found that this increases participation and engagement, even with large sessions delivered online to more than 200 students.

Conclusion

The pandemic has changed the way pathology teaching at the undergraduate level can be delivered. With more medical schools using an integrated approach, this ensures that teaching can be delivered by pathologists as part of the curriculum, even if there is no 'pathology block' in a course. However, care must be taken to find the optimum platform on which this teaching is delivered if the appropriate interface between the university and the NHS is to be achieved. This use of additional tools to optimise interactivity gives added value to the sessions.

References are available on our website.

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WORKING SMARTER

Creation of e-forms in CRRS to facilitate a robust clinical record for clinicians

This collaborative effort between the microbiology and critical care teams has led to successful implementation of an electronic form to capture key information for patient care.

Natasha Ratnaraja

Sukhdeep Bhutta

Karl O'Sullivan-Smith

Introduction

The medical microbiology (MM) service at University Hospitals Coventry and Warwickshire NHS Trust (UHCW) works in close partnership with the Trust's infectious diseases (ID) physicians. There are weekly infection multidisciplinary team (MDT) meetings, endocarditis ward rounds with a cardiologist and antimicrobial pharmacist, and joint trainee training with the virology team; regular MDTs for bone and joint, haematology, renal and neurosurgery; and a regular joint outpatient antimicrobial therapy service. The daily clinical microbiologist intensive care ward round is joined twice weekly by ID colleagues.

The intensive care ward round at UHCW NHS Trust involves a physical round reviewing patients on the General Critical Care (GCC) and Cardiothoracic Critical Care (CTCC) units, followed by a cardiothoracic ward review. In addition, daily ward consults are undertaken, reviewing all patients with *Staphylococcus aureus* bacteraemia and any patients with complex infections.

Concerns about the risk of transcription errors and previously poor recording of microbiology advice on these ward rounds with a perceived lack of continuity of advice led to the GCC team populating a pre-printed sticker for each patient with infective concerns (Supplementary Figure 1). MM simultaneously populated a list of all GCC patients with pathology data (Supplementary Figure 2). This was resource intensive and inefficent as only patients with infective concerns were discussed on the ward round.

Once patients left the unit, these were filed for a week and then securely destroyed.

In late 2018, the form was streamlined. Although compact and easier to follow, it remained labour intensive (Supplementary Figure 3).

Challenges

The UHCW microbiology department is evolving in accordance with the need for broad-based specialty training[1] and has an increased clinical ward presence. Although we do not have an electronic prescribing record (EPR), the Trust results and reporting system – Clinical Results Reporting System (CRRS) – is considered a 'mini' EPR. Ward rounds, consultations and patient care episodes are documented in paper patient medical records.

The laboratory electronic system used by Coventry and Warwickshire Pathology Service (CWPS) does not have a patient notes facility. Notes can be added onto sample results and are visible on CRRS. However, discussions on patients without samples cannot be recorded electronically. There is potential for transcription errors in the paper medical records, and discrepancies between advice given and advice documented.

The inability to electronically document a conversation or ward review was felt to be a potential safety risk and clinical governance issue. It risked poor continuity of care owing to a lack of clarity on what microbiology colleagues had advised for complex patients. ID and microbiology often advise on the same patient, leading to discrepancies in advice given, or necessitating a call to the other team for clarification.

In GCC, it wasn't always clear from the notes which microbiologist had provided advice. There were reports of mixed messages, either due to misunderstanding or lack of continuity of information provided to the microbiology team.

CRRS currently has a 'notes' function, and it was agreed this would be used as a temporary stop gap, with discussions recorded under consultant microbiologist and microbiology speciality. However, the function of notes is for a brief note to be added, limiting its utility for full documentation. Further advice and ward visits have to be recorded on separate notes, impacting continuity of advice.

Despite using laptops, printed paper patient forms were still required to quickly see previous results and advice. Any decisions were still documented in the notes using the GCC stickers, and retrospectively on CRRS notes.

It was agreed that a shared electronic solution was required for the GCC, endocarditis and clinical consult ward rounds. However, the Trust is currently in the process of acquiring and implementing an EPR system, impacting on any new work likely to be superseded by the new system.

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Rohini Patel

A safe and easy electronic notes system needed to be implemented.

Actions

Working with the Trust's Systems Development team we created an e-form on CRRS that captures all the required data for GCC and MM (Supplementary Figure 4). Drop-down lists capture ward round attendees from GCC, MM and ID. The last three peripheral white cell counts (WCC) and C-reactive protein (CRP) are auto-populated from CRRS. Saving every entry retains typed information on the e-form. However, re-opening the form updates the CRP and WCC. Previous forms remain visible on CRRS as historical entries.

It was agreed that as the e-form documents the ward round, GCC stickers were no longer required. GCC emailed details of patients they wished to discuss to the MM team every morning, allowing prior creation of patient e-forms and a CRRS summary list of all 'active' patients. Any additional patients have forms created during the ward round. This was implemented in January 2020 and called 'Critical Care ward round', facilitating its use on patients in GCC and CTCC. The new process was audited alongside the old one to see if it made any difference to the MM team.

Table 1 compares the time taken to create separate patient e-forms compared with time to create a Microsoft Word paper patient list. Because a new paper list was created daily, including every GCC inpatient, the number of patients is higher. In total, ten sheets of paper were printed daily for paper lists – eight sheets of paper for the completed MM patient list and two sheets for a list of all GCC ward inpatients. The new system used approximately a third of the time previously used to populate the list.

The new e-form has been informally positively received by GCC and MM staff for its ease of use and provision of clear decision making. Although COVID-19 has precluded full formal audit, there has been some formal feedback (Supplementary Table 1) and now all patients, including those without infective issues, are discussed in person, complying with critical care standards.

The e-form template has been modified to create e-forms for the endocarditis MDT ward round and neurosurgical and haematology MDTs. The infection service/microbiology reviews e-form is another modification to the template, documenting advice on complex patients, including patients with *Staphylococcus aureus* bacteraemia, and ward visits. Only the infection service (MM and ID) have full read and write access to these e-forms; all other users have read-only access. This allows sharing of information between MM and ID and can prevent duplication of work, especially with patient referrals.

The COVID-19 era

Soon after implementation, SARS-CoV-2 causing COVID-19 was identified. Physical critical care ward rounds ceased to preserve personal protective equipment for those providing direct patient care.

Currently, ward rounds are temporarily being undertaken with intensivists in critical care non-clinical offices. Critical care workload precludes us receiving a list of patients with infective concerns beforehand. However, e-forms are easily created during patient discussions. Microbiology results are reviewed using the CWPS computer system on the laptops.

Summary

The creation of e-forms has allowed the infection service to become more multidisciplinary and collaborative. It provides a streamlined and effective means of documentation of discussions

Table 1: High-throughput sequencing (next-generation sequencing) methods.

Day	ITU WR list	Infection service	Word doc
Day 1	Time	40 mins	1 hr 20 mins
	No. of patients	11	21
	No. of pages printed	0	8 + 2 for the WR list in morning
	No. of new patients	0	0
Day 2	Time	30 mins	1 hr 30 mins
	No. of patients	11	23
	No. of pages printed	0	8 + 2 for the WR list in the morning
	No. of new patients	2	3
Day 3	Time	30 mins	1 hr 10 mins
	No. of patients	11	23
	No. of pages printed	0	8 + 2 for the WR list in the morning
	No. of new patients	1	5

ITU: intensive care unit; WR: ward round.

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with service users. Time saved preparing for ward rounds can now be spent in the laboratory or on physical patient reviews.

References, supplementary figures and tables available on our website.

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Drive-through phlebotomy

During the pandemic in-person blood testing has decreased, with potentially serious consequences for patients. Labs in Sheffield have responded with a novel drive-through system, allowing regular service to resume.

Background

In March 2020, the laboratories of Sheffield Teaching Hospitals NHS Foundation Trusts (STHFT) recognised a reduction in the number of blood samples they were being sent due to the COVID-19 pandemic. This presented a significant risk to patient care because of limitations on diagnostic and monitoring tests. Primarily, the decrease in blood samples was caused by reduced phlebotomy capacity due to restricted services (social distancing or closures) and/or high levels of patient anxiety leading to reduced attendance at traditional sites for fear of risk of infection. To re-establish the capacity for phlebotomy while limiting the risk of COVID-19 infection, STHFT proposed an innovative and novel drive-through phlebotomy service.

The service

The Trust erected a large 30 m x 15 m marquee in the car park of the FlyDSA Arena, a sports and concert venue in Sheffield. The open-sided structure was divided into five lanes, each with a phlebotomy station with the integrated clinical environment order communications system on a 4G-enabled laptop and label printer. The concept was that patients would attend the site within an enclosed vehicle. After being questioned for possible COVID-related symptoms, non-symptomatic and negative patients in their vehicle would be directed to one of the stations. With the engine turned off, the phlebotomist would then interrogate the system to find the patient's request and print the appropriate labels at source. Through the wound down car window, the patient would pass their arm to have the appropriate samples collected.

A phlebotomist taking a sample from a patient at the FlyDSA Arena site in Sheffield.

Once venepuncture was complete and it had been established the patient was safe to proceed, the car would drive on through the far side of the marquee and leave the site. Patients who were identified as displaying symptoms of COVID or who indeed had tested positive but needed urgent tests went through the same process, but rather than going through the marquee were passed down the outside of the structure. This identified potentially infective patients to staff who would use extra PPE while segregating them from non-symptomatic patients by use of a physical barrier.

The service went live in April 2020 with a no appointment first-come, first-served system. Initially set up for vulnerable patients, it was soon extended to all services across the city, both hospital and GP. Within a month, in excess of 300 patients in their vehicles were attending the site daily. In May, the marquee was extended to accommodate two further lanes, seven in total. Initially opening weekdays only, demand soon exceeded capacity and the service was extended to offer Saturday openings. By mid-summer 2020, the site was seeing in excess of 1,600 vehicles per week.

By late 2020 and with the days shortening and colder temperatures, the Trust supported a proposal to relocate the service to a more winter-resilient site. In December, just as the arena set-up had seen its 50,000th phlebotomy event, the service moved to the site of the former blood transfusion centre, next to the Northern General Hospital.

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Staff at the drive-through service at Longley Lane, Sheffield.

Retaining the drive-through format, seven phlebotomy stations were established in the site's large garage, which formerly housed the centre's collection and delivery vehicles. Large doors at either end of the space supported vehicular flow and large car parks outside enabled sufficient car space for queuing. The new site enabled better protection from the elements for the staff in terms of heating and lighting and allowed the service to open longer hours.

Benefits

In the 12 months since the drive-through service was established, it has realised many benefits. For the patient, the format delivered a high-throughput, efficient process of sample collection supporting social distancing. This limited the risk of COVID-19 infection, and in turn reduced patient anxiety significantly. Through feedback, patients highlighted many benefits.

- Speed of use – patients report the service is quicker than traditional services and enables them to fit it into their daily routine.
- Parking – this system negates the need to park on hospital sites, with associated issues of finding a space and the cost of parking.
- Mobility – patients do not need to leave their vehicle, making it easier for those with mobility issues.
- Relatives/dependants – patients who have dependents to care for report that the drive-through is easy for them to use. Relatives/dependants with mobility/dementia issues or children can accompany the patient in their vehicle without the need to organise carers or childcare and this reduces the need to take dependants with them through hospital sites.
- Comfortable environment – patients are in control of their own environment (e.g. heating/entertainment), reporting often that this reduces their stress and anxiety.

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One of the phlebotomists taking a sample from a patient through the car window.

There were also been benefits for service users. Since the pandemic started, the drive-through has helped deliver efficient and effective use of remote appointments via video and telephone. With clinicians having access to timely, up-to-date results generated from visits through the drive-through and efficient test turnaround times, monitoring and treatment can be easily facilitated as opposed to the alternative of lack of monitoring or diagnostic markers.

The laboratory has also seen significant benefit from the service compared with traditional phlebotomy sites. As samples are collected from the drive-through site hourly and transported back to the laboratory directly, this enables a quicker turnaround time. Nearly 90% of samples from the service are processed within two hours from sample draw. In addition, more frequent delivery to the laboratory spreads the workload throughout the day, meaning better utilisation of staff time and analyser capacity. Sample quality has also improved owing to the well-trained, highly competent phlebotomy staff and reduced transit time.

The future

What is the future for the drive-through phlebotomy service? From a recent survey of patients, 94% indicated they would use the service again in the future, with nearly 70% stating they would choose it over traditional sites. Clinicians state that having access to a service like this has enabled them to work smarter in different ways. The indications show that both clinicians and patients do not want to return to all face-to-face appointments with some services already planning to continue to offer remote consultations. For that matter, will patients ever again want to sit again in a crowded waiting room?

The scope of the drive-through has been extended to accommodate some point of care testing (POCT) and the possibility of further expansion is being considered. Capillary blood gas tests are being facilitated for patients with motor neurone disease at the drive-through and this is expected to be rolled out to other patient groups. The potential for using wider POCT to signpost patients rapidly to appropriate services could become a future use of the format.

Summary

The post-COVID world may be quite different to the one we worked in before to deliver our services. Solutions developed out of necessity have now become the norm for the patient. We should embrace what has worked and look at how we can develop further. The drive-through phlebotomy service has been and continues to be an invaluable resource through the pandemic. However, maybe it has a place in patient care long into the future.

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SMALL IS BEAUTIFUL

Paediatric and perinatal pathology

Dr Sophie Stenton

Rachel Rummery

Despite being a relatively small specialty in terms of training and consultancy posts, paediatric and perinatal pathology is a wide-ranging subject with many opportunities for clinicians, educators and trainees.

What is paediatric and perinatal pathology?

Paediatric and perinatal pathology is one of the subspecialties of histopathology as recognised by the Royal College of Pathologists. It is a broad specialty that encompasses the pathology of the fetus, infant and child, along with several interlinked areas of interest: placental pathology, paediatric surgical pathology and the paediatric and perinatal post mortem.

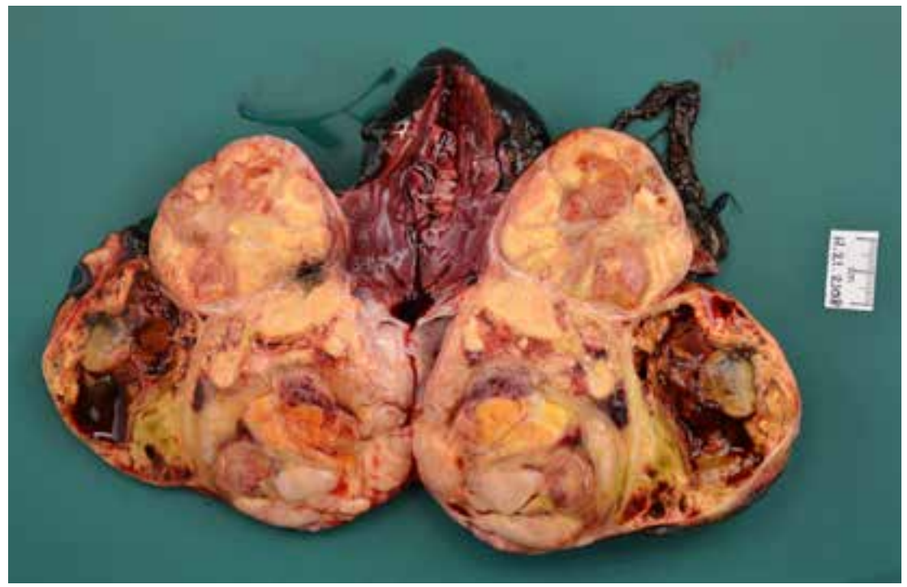
Paediatric and perinatal pathology is indeed a small specialty, with approximately 15 national training posts and less than 60 consultants in centres across the UK. While some pathologists are based in children's hospitals with dedicated paediatric mortuaries, most pathologists work in general histopathology departments and share mortuaries with other specialties. Both surgical and perinatal work can be sent internationally for specialist examination.

Why paediatric and perinatal pathology?

For many paediatric and perinatal pathologists, the variety and the breadth of the work is the initial attraction to the specialty. Specialists will engage with the technical challenge of performing early fetal post mortems using a dissection microscope, the examination of complex congenital heart disease in a sudden unexpected death in a child, the histological interpretation of rare and complex paediatric tumours (Figure 1), the use of increasingly sophisticated molecular investigations in routine caseloads, and the valued clinicopathological correlation at multidisciplinary team meetings. These are all in a day's work for a paediatric and perinatal pathologist.

There are opportunities to become 'super-specialists' by acquiring expertise in a particular area, such as paediatric lung disease or paediatric sarcoma. Some choose to exclusively work in the field of perinatal pathology or focus their efforts entirely in the sphere of paediatric oncology. The type of surgical work varies by tertiary centre and service requirements, but in a world in which district general pathologists are encouraged to become oligospecialists, paediatric pathologists can still potentially report on a biopsy or resection from any anatomical site or organ system. A broad understanding and knowledge of pathological entities and the pathophysiology of disease is needed; rare and unusual specimens including

Figure 1: Macroscopic image of a bisected nephroblastoma prior to fixation.



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developmental anomalies are not an uncommon feature in day-to-day surgical reporting.

Life as a consultant within this specialty

Perinatal pathology includes the post-mortem examination of stillborn infants, both early and late miscarriages, and neonatal deaths (provided the cause of death has been accepted by the coroner). These examinations can provide crucial information to help guide the management of future pregnancies. This information can also help families and clinicians come to terms with these very distressing events. Appreciation of normal fetal histology throughout every stage of development is imperative, along with careful clinical–pathological correlation, which can also include input by clinical geneticists.

Placental pathology is an integral part of perinatal pathology, with placental examination recommended in all fetal post mortems. However, the pathology of placentas from liveborn infants comprises the majority of most departments' placental workload. Analysis is particularly useful in the investigation of intrauterine growth restriction, maternal or fetal sepsis, gestational trophoblastic disease and birth complications. The information gained can be useful in the immediate care of the mother and infant or may change the management of subsequent pregnancies if a potentially recurrent condition is diagnosed.

As a consultant, there are opportunities to perform paediatric post-mortem examinations on behalf of the coroner. Most consultants will undertake these at some point during their career, which can be both intellectually stimulating and immensely rewarding. Post-mortem examinations in infants and children differ significantly to their adult counterparts in their complexity and use of ancillary investigations, including extensive histology, routine metabolic studies and genetic testing. Detailed clinicopathological correlation is essential. Investigations following the sudden death of a child follow the Kennedy protocol and often involve liaising with police officers, social workers, paediatricians and other professionals at joint agency meetings.[1] Discussing the post-mortem results with the family can be challenging, but there is comfort in knowing that you are helping a family during such a devastating period in their lives.

Some pathologists may choose to undertake 'double doctor' examinations with forensic pathologists in cases of suspicious deaths. In these circumstances, the forensic pathologist leads in the detailed examination of the body for evidence of injury and abuse, while the paediatric pathologist is challenged to identify organic disease that could account for the findings and potential cause of death. Such work, again, can be satisfying from a problem-solving perspective. Alas, owing to its nature, these cases inevitably attract a significant amount of media interest and the prospect of providing evidence in crown court is not for the faint of heart. For those interested, however, it can provide avenues into private medicolegal work.

The benefits of working in a small specialty

The beauty of working in a small specialty is the support that one receives from colleagues, both nationally and internationally. Everyone knows everyone in this subspecialty and there are ample opportunities (COVID pending) to network with peers at the annual Paediatric Pathology Society and the British and Irish Paediatric Pathology Association (BRIPPA) meetings. The International Paediatric Pathology Association course is also a wonderful teaching opportunity aimed at consultants wishing to gain further knowledge and expertise in their field from internationally renowned pathologists. Held annually and hosted in various international locations, the course lasts five years and upon completion provides further access to post-graduate learning.

Working within a small community of pathologists also allows greater opportunities to become involved with activities and committees within the Royal College of Pathologists and affiliated organisations. Additionally, there are plentiful educational roles and research opportunities, should one seek such a career path.

What does the future of paediatric and perinatal pathology look like?

Looking to the future, there are a number of challenges and potential changes on the horizon for the specialty, including overcoming poor workforce planning, meeting the increasing demand for fetal magnetic resonance imaging (MRI), understanding the increasingly complex milieu of molecular investigations for tumour diagnosis, and the never-ending battle with placental reporting.

However, with each challenge there is opportunity and the potential for growth. Four centres across the UK now routinely offer fetal MRI as an alternative to the traditional post mortem. Coupled with genetic testing and placental examination, a relevant condition at the time of death (ReCode) can often be achieved without the need of any disruption to the body.[2] This technology should be further embraced by the specialty, through collaborative efforts with our radiology colleagues to achieve equal access to MRI post mortems across the country.

Ongoing reviews of the curriculum with specialist placements in cytogenetics and opportunities to undertake post-graduate qualifications in genomics should be encouraged to prepare new consultants with a solid foundation of molecular techniques. Workforce problems and placental reporting go hand-in-hand; a solution (which is likely controversial to some colleagues) may be to follow other subspecialties' examples by training advanced biomedical scientists in reporting a proportion of the placental workload. This would require careful consideration and discussion among those in the College's Specialty Advisory Committee and BRIPPA membership.

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Rachel Rummery undertaking a fetal post mortem with the aid of a dissection microscope.

Interested in a career in paediatric and perinatal pathology?

Trainees are required to undertake at least two years of the general histopathology training programme and obtain the FRCPath Part 1 exam before entry into the specialty. Candidates may then apply via national recruitment for entry to the ST3 level. Trainees are expected to complete three further years of training and complete the Paediatric and Perinatal FRCPath Part 2 exam.

The specialty is supportive of trainees undertaking out-of-programme experiences in research or management. The small size of the specialty also means there is ample opportunity to be involved in College activities such as the Trainee or Specialty Advisory Committees. There is considerable demand for consultants, so the career prospects are excellent.

A short placement in paediatric pathology is part of the general histopathology training curriculum, but any doctor who has an interest in this career could arrange additional taster sessions with approval from their Training Programme Director. Paediatric and perinatal pathologists are always keen to promote interest in our specialty, so anyone expressing an interest will be made to feel most welcome.

The College incorporates paediatric pathology within its educational programme, and recent and upcoming events include courses on developmental neuropathology, soft tissue and the placenta. For further information on training and specialty-related news, please access the Paediatric and Perinatal Pathology training section of the College website.

References available on our website.

Dr Sophie Stenton
Consultant Paediatric and Perinatal Pathologist
Sheffield Children's NHS Foundation Trust

Rachel Rummery
ST5 in Paediatric and Perinatal Pathology,
Yorkshire and the Humber

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Appreciation: Professor Joan Zilva

Professor Joan Zilva, probably best known by generations of medical and scientific trainees for the book *Clinical Chemistry in Diagnosis and Treatment*, died recently at the age of 95 from the frailty of old age.

She was born and spent the first part of her childhood in South London. She remembered having her tonsils removed under open ether anaesthesia at the age of five and seeing molten glass from the burning Crystal Palace flowing in the gutters in 1936. She was evacuated to Canada early in the Second World War, an experience that she recorded in a pamphlet and which stayed with her all her life.

Zilva was a pioneer. She qualified in medicine from the Royal Free Medical School (women-only at that time), with an intercalated BSc in physiology. There was considerable prejudice against women in medicine at that time (and for many years after) and she sacrificed the possibility of marriage for her career. She trained in general medicine and pathology, gaining an appointment consultancy and position as chair in chemical pathology at the Westminster Hospital Medical School. She saw the subject blossom from its early days as a minor branch of pathology to a specialty in its own right, a process to which she made a considerable contribution.

Clinical Chemistry – co-authored by Peter Pannell, a registrar in her department and later a consultant in Australia – became the leading textbook of the subject and was published in several editions. She was made an Emeritus Member of the Association of the Association of Clinical Biochemistry and was an active member of the Medical Writers' Group of the Society of Authors. She served as Assistant Registrar to the Royal College of Pathologists for three years.

After retirement, she enjoyed travelling and spending time with friends old and new, including the occupants of the apartment building where she lived for many years. She was a kind and generous person and provided practical help to her neighbours, which was reciprocated as her own mobility and health (but not her wit) deteriorated in her later years. Her death at the age of 96 marks the end of an era.

William Marshall
Emeritus Reader in Clinical Biochemistry
King's College, London

Dr Sharran Grey Consultant Clinical Scientist awarded an OBE for services to blood transfusion and patient care

In this profile, Dr Sharran Grey discusses her varied career pathway from a trainee biomedical scientist to receiving an OBE for her services to patient care.

At the end of the year we would all rather forget, I received an email from the Cabinet Office asking if I would accept an OBE for services to blood transfusion and patient care. After I recovered from the initial shock, I felt humbled and hugely honoured to be recognised in this way for my individual contribution to a career that began 34 years ago.

Gaining skills and knowledge

I have been fortunate to have had a varied career, which started as a trainee biomedical scientist (BMS) in haematology and transfusion. I worked in various roles as a BMS, including clinical and laboratory transfusion management. My role developed as Clinical Lead for blood transfusion and increasingly involved more research, innovation and direct patient care.

Improving patient care through research and innovation

I registered as a clinical scientist through the Academy of Healthcare Science equivalence and

was in the first cohort of Higher Specialist Scientist Trainees in haematology. I was awarded the NHS England Chief Scientific Officer's Healthcare Science Award in 2017 for my doctoral research on accelerated red cell transfusion for selected patients. This research also led to the development of a red cell dosage calculator app, which improves the achievement of a patient's haemoglobin target. This is now a registered medical device and is available to other NHS organisations.

My research interest in the pulmonary complications of transfusion led to my role with Serious Hazards of Transfusion, where I have been the working expert for transfusion-associated circulatory overload for several years, contributing to this area on an international level. I find a great deal of satisfaction in problem solving through research and innovation and making a difference to patients and healthcare professionals in everyday practice. I still have a list of things I would like to do and wish I had the time to match my enthusiasm!

Multitasking roles and a blended workforce

Since completing my FRCPath and training, I now work in Lancashire Haematology Centre (Blackpool Teaching Hospitals NHS Foundation Trust) as a haematology consultant clinical scientist. My role is split between my haematology diagnostics clinic and joint obstetric haematology clinic, and my responsibilities as Haematology and Transfusion Laboratory Director at Lancashire Teaching Hospitals and Laboratory Clinical Lead at Blackpool Teaching Hospitals, and lead consultant for transfusion across both sites. The haematology consultant clinical scientist role was developed to help address pressures in the medically qualified consultant haematologist workforce and is in the early stages of wider recognition and implementation. However, I was pleased to be invited to work with the National School of Healthcare Science to help promote the benefits of a blended workforce.

The value of a patient-first approach

Although I do not know who nominated me for a New Year Honour, I am immensely proud that someone among the many very respected colleagues I have worked with over the years felt that my contribution deserved this huge honour. Everything I do and every decision I make starts with the patient, whether this has been for research and innovation, the services I am responsible for or my service to the individual patients in my care. None of this would be possible without the amazing, multiprofessional teams I work with across the NHS and beyond. It is an honour and a privilege for my individual contribution to be recognised in this way, to be a role model for my profession as a clinical scientist and to be part of our wonderful NHS.

Dr Sharran Grey OBE
Haematology Consultant Clinical Scientist
Lancashire Haematology Centre

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Deaths reported to Council

The deaths of the following Fellows were announced at the 22 April 2021 Council meeting. We extend our condolences to those who grieve for them.

Christopher Johnson, Czech Republic
Nigel Robert Peel, York, UK
Donald Edward Stevenson, USA
Tom Wade-Evans, Hereford, UK

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 26 May 2021.

Please note, we receive no return following 20% of AACs. Any forms received after 26 May 2021 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 Hospitals of Leicester	Leicester Royal Infirmary	Dr Rebecca Allchin
Kent, Surrey and Sussex	Ashford and St Peter's	Ashford and St Peter's	Dr Caroline Hawche
	Dartford and Gravesham	Darent Valley	Dr Vijayavalli Dhanapal
	Epsom and St Helier	across sites	Dr Jennifer L Bosworth
	Epsom and St Helier	across sites	Dr Fatin Sammour
	Medway	Medway Maritime	Dr H Himali D Mendis
	Royal Surrey	Royal Surrey County	Dr Sophie L Lindsay
North, Central and East London	Barts	across sites	Dr Tadbir K Bariana
	Royal Free	across sites	Dr Julie Glanville
	Barking, Havering and Redbridge	Queens	Dr Md S Islam
Northern Ireland	Belfast	Belfast City	Dr Richard C Gooding
	Northern Ireland Blood Transfusion Service	Belfast City	Dr Joanne Murdock
North West London	Great Ormond Street	Great Ormond Street	Professor Marc R Mansour
	Imperial	Hammersmith	Dr Christine O Ademokun
	Whittington	Whittington	Dr Annabel McMillan
South West	NHS Blood and Transplant	NHSBT Blood Centre	Dr Farrukh T Shah
Wales	Welsh Blood Service	Velindre	Dr Edwin J R H Massey
West Midlands	Ministry of Defence Medical Services	Defence Medical Services	Lt Col Lucinda Blake

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Histopathology and cytology appointments

Region	Employing body	Base hospital	Appointee
East of England	West Hertfordshire	Hemel Hempstead	Dr Bharati Tripathi
North, Central and East London	Barts	The Royal London	Dr Muneezeh Liaqat
South West	North Bristol	across sites	Dr Delyth A Badder
Yorkshire and the Humber	Leeds	St James's	Dr Foteini Malta
	The Mid Yorkshire	Dewsbury	Dr Melanie Levy
Wales	Cwm Taf	Royal Glamorgan	Dr Adam Dallmann
	Cwm Taf	Royal Glamorgan	Dr Daniel Hopkins

Medical microbiology, communicable disease control, virology and epidemiology appointments

Region	Employing body	Base hospital	Appointee
East of England	West Suffolk	West Suffolk	Dr Gillian Urwin
North, Central and East London	Homerton	Homerton	Dr Tacim Karadag
South London	King's College	King's College	Dr Martin N Brown
	King's College	King's College	Dr Hector G Maxwell-Scott
South West	Royal United Bath	Royal United	Dr Georgina Beckley
Yorkshire and The Humber	Sheffield Teaching and Sheffield Childrens	across trusts	Dr Christopher A Lynch
Wales	Public Health Wales	Swansea Bay	Dr Edward R Bevan
West Midlands	Black Country	Royal Wolverhampton	Dr Kathryn French
	Ministry of Defence Medical Services	Defence Medical Services	Dr Jason S Biswas

Consultant clinical scientist appointments – clinical biochemistry

Region	Employing body	Base hospital	Appointee
East of England	Norfolk and Norwich	Norfolk and Norwich	Dr Emily-Rose Leach
North West London	Whittington	Whittington	Dr Michelle Young

Consultant clinical scientist appointments – histocompatibility and immunogenetics

Region	Employing body	Base hospital	Appointee
York and the Humber	Leeds	St James's	Dr Katherine L Mounsey

Percy Oliver Trainee Travel Bursary

The Percy Oliver Trainee Travel Bursary is offered each autumn to a value of up to £500.

The bursary can be used to cover travel and accommodation costs for trainee clinicians and clinical scientists enrolled in a recognised UK training scheme and working in the field of transfusion medicine, to enable their participation in a national or international blood transfusion meeting.

The deadline for applications are 5pm on Friday 27 August 2021.

Further details and an application form can be downloaded from the College website.

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Trainee research medal awards

The College received an exceptionally high standard of applications for the 2021 medals. Thank you to everyone who applied. The winners are listed here.

Winner	Medal category	Paper topic	Award
Matthew Clarke	Histopathology	Infant High-Grade Gliomas Comprise Multiple Subgroups Characterized by Novel Targetable Gene Fusions and Favorable Outcomes.	Gold
Caroline Watson	Haematology	The evolutionary dynamics and fitness landscape of clonal hematopoiesis	Gold
Lara Menzies	Clinical Genetics	Intracranial Vascular Pathology in Two Further Patients With Floating-Harbor Syndrome: Proposals for Cerebrovascular Disease Risk Management	Silver
David Marshall	Clinical Biochemistry	Assessment of Tacrolimus and Creatinine Concentration Collected Using Mitra Microsampling Devices	Silver
Ben Challoner	Cellular Pathology	Computational Image Analysis of T-Cell Infiltrates in Resectable Gastric Cancer: Association with Survival and Molecular Subtypes	Silver
Marwan Kwok	Haematology	Integrative analysis of spontaneous CLL regression highlights genetic and microenvironmental interdependency in CLL	Silver
Thomas Milner	Neuropathology	Polycomb-mediated repression of EphrinA5 promotes growth and invasion of glioblastoma	Silver

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Examination results

Successful candidates for the Part 1 Examination

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

Clinical Biochemistry

Roshaida Abdul Wahab
Saleem Ansari
Kofi Antwi
Suzanne Armitage
Laura Emily Briggs
Nathan Cantley
Ryan James Cooper
Pooja Dhiman
Osama Eisa
Rosie Forster
Kirsten Grant
Saliha Mohammed Ismail Haji
Ahmed Hassan Mohammed
Hassan Handhle
Lucy Hawkins
Katy Hedgethorne
Daniel Hills
Anjly Jain
Eun Ji Kim
Aagna Kurup
Lanka Nishanthi Liyanage
Gregory Lynch
Amy Ellena Katharine Mallorie
Kirsty McCance
Ben McDonald
Melissa McNaughton
Joshua Newmark
Divya Patel
Soundravally Rajendiran
Kathleen Rice
Jennifer Simpson
Rebecca Stead
Abigail Stow
Alessandra Tetucci
Wanninayake M S S K
Wanninayake
Helen Wiggins
Robert Williams
Sarah Challenor
Hiu Yan Chan
James Clark
Alison Delaney
Christie Drury
Eoghan Dunlea
Modupe Eze
Oliver Firth
Melissa Friday
Masuma Ghazanfar
Betty Gration
Pooja Gupta
Cecilia Gyansah
Rupen Hargreaves
Lea Haskins
Sophie Holmes
Thura Win Htut
Abubaker Awad Mohamed-ahmed Ibnouf
Nkemdirim Jacob
Chamindi Nadeeshani Jayasundara
Lucy Kamuriwo
Ganesh Kasinathan
Claire Kelly
Helen Lane
Giao Le
Charlotte Lees
Eleni Louka
Marcin Lubowiecki
Muhammed M.Saleh
Tara Maisel
Abigail Martin
Suzanne Maynard
Joel McCay
Fergal McGlynn
Thomas McGrath
Rachael Medland
Shivir Moosai
Hafsa Muhammad Hanif
Olga Oconnor
Hajer Oun
Rachel Peck
Matthew Powell
Zahbia Saleem
Timothy Patrick Andrew Sarkies
Urmi Sheth
Gayathriy Sivaguru
Thomas Skinner
Frederick Thomas Seymour Soole
Robert Spackman
Matthew Steel
Mehwesh Taj
Sui Keat Tan
Joseph Taylor
Bing Tseu
Scott Veitch
Indrani Venkatadasari
Sachini Pamoda Warnakulasuriya
Sarah Wheeldon
Callum Wright
Lim Xiu Qi Cheryl
Nadeeka Dilrukshi Yapa Mudiyanselage
Jun Yong

Haematology

Asha Aggarwal
Mohammed Abdelwahab Elebaid Ali
Yahya Almohmeed
Claire Anderson
Chieh Hwee Ang
Farhan Ali Anjum
Luke Attwell
N Walawwe Vindhya Manori Neelawathura Bandara
Khalil Begg
Joshua Alexander Bomsztyk
Kanwal Aftab
Shikha Agarwal
Akshay Anand Agarwal
Hagir Hussein Taha Ahmed Ahmed
Manal Ahmed
Nishtha Ahuja
Mohammed Fawzi Abdulmahdi Al Qanbar
Assem Al Rumeh
Bashar Kamaleldin Ahmad Aldaraiseh
Hasan Qasim Mohammed Ali Al-Dayyeni
Syed Salman Ali
Safiyh Aljohani
Ayman Al-Kawaz
Abdullah Almanea
Halah Raheem Al-Midhatee
Ibrahim Sinan Abdulfattah Almudares
Nada Al-Muqaimi
Rasha Al-Nuaimi
Sheena Alphones
Abdulmalik Alqahtani
Moayad Alqazlan
Muntasser Alsharabati
Marwa Altikriti
Himabindu Arisetty
Angeli Michelle Arthur

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Maimoona Aslam
Maria Aurora Astudillo-Gonzáñez
Lobna Attia
Alhareth Azaizeh
Aymn Babiker
Malini Bagani
Praveen Shankar Balasubramanian
Mahmoud Bardisi
Hala Zuhair Basheer
Azra Bashir
Dawn Baynes
Harresh Kumar Bhoopathi
Jaseela Bp
Mayen Briggs
Sobia Butt
Thomas Butters
Flora Campbell
Rachel Carey
Wai Suen Madeleine Chau
Vaibhavi Chaudhari
Aparna devi Chenniappan
Tin Yan Elaine Cheung
Seow Fan Chiew
Sai Shalini Chinnathambi Narayanan
Ashutosh Arun Chitale
Bela Chitale
Chandan Chowdhuri
Sinclair Couper
Siddhartha Dilip Dalvi
Shirin Dasgupta
Karthiga Dharmaraj
Gowri Manohari Doss
Justine Durno
Chloe Durrell
Orwa Elaiwy
Kholoud Elbamby
Joanne Ellerington-Carter
Mohammed Saeed Shareef
Fadhil Fadhil
Salman Faifi
Deepshikha Gaire
Syed Gilani
Connor Gilder
Geethanjali Gude
Tahmina Gul
Eylul Gun
Pallav Gupta
Spoorthy Gurajala
Husam Haddad
Mays Wadullah Ahmed Hadeed
Aziza Haj Nour
Howida Hamed Hamed
Matthew Hanks
Jowairiah Hassan
Salaheldin Hassan
Liam Hems
Amanda Hilton
Umar Hussain
Katherine Iles
Cristina Ilinca
Christopher Noel Jackson
Mina Jafari
Morten Ragn Jakobsen
Salma Jan
Umara Jan
Mohamed Jassim B
Leena Jayabackthan
A G B A Jayarathna Pahalawalpola Gamarallage
Amali Nisansala Jayathilaka
Craig Johnstone
Deborah Marie Jones
Lopa mudra Kakoti
Farah Kalsoom
Eleanna Kara
Ramandeep Kaur
Aeman Khalid
Rabeea Khalil
Faria Waqar Khan
Saima Khan
Binit Kumar Khandelia
Nicholas Kruseman Aretz
Lalit Kumar
Qi Ji Lai
Gengying Ivan Lee
Alex Lewington
Ming Han Lim
Shujing Jane Lim
Kanchana Sanjeewani Liyanaarachchi
Chun Hai Lo
Holly Lomas
Jai Kishan Rao Lomte
Emma Longley
Yin Wing Lui
Cheryl Lung
Donna Glens Mary M
Monika Madrova
Daisy Maharjan
Victoria Malone
Rizni Mansoor
Heeba Maqbool
Anna Mason
Casey Julia McCusker
Eleanor McTaggart
Rajapakshage Dharani Kaushalya Medonsa
Ankita Mehta
Saikat Mitra
Lina Moawad
Mahrose Mohsin
Amina Chahrazed Mokhtari
Camila Mondaca
Munasinghe Arachchige Dinuka Nayanganee Munasinghe
Jacinta Sheila Murray
Deepa Nagarajan
Daniel Nash
Bhavna Nayal
Mohammed Nimir Khalid Nimir
Maria Novotna
Donna O'Dwyer
Christian Chika Ogbu
May Phyu Oo
Louise Osgood
Nicola Katy Oswald
Prajitha P
Ipsita Panda
Lakshmi Manasa Perubhotla
Pooja Phalak
Lavisha Punjabi
Nicola Jane Pyatt
Dalya Qusay Alkhaleefa
Prameela Radhakrishnan
Nisheena Raghavan
Gayatri Raghuram
Lakshmi Rajagopal
Junu Rajan
Garima Rakheja
Kai Rakovic
Niluka Dhamminie Ranathunga
Manal Rauf
Antoinette Elisabeth Roets
Mahera Roohi
Navarasi S Raja Gopal
Shahram Sabeti
Ghazala Sadaf
Shreya Sadhu
Claudia Santos
Urwa Sarwar
Soumya Satheesh
Nanditha Sathyanarayana
Aravind Sekar
Sharmila Selvan
Arupparna Sen Gupta
Tejal Shah
Shegufta Sharmin
Kastytis Sidlauskas
Bushra Sikandar
Karunanayake Gayathri Hiroshi Silva
Monika Singh
Aneet Singh
Kannan Sivaraj
Anisah Soobraty
Dauda Suleiman
Sahithi Surapaneni
Harshavardhini Suthanthira Ganesan
Jaseela T K
Khojasta Talash
Mohd Talha
Parul Tanwar
Naima Tariq
Nese Tekman
Minu Thomas
Sumi Thomas

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Frances Tippins
Adeel Haider Tirmazi
Bill Turner
Emily Tyler
Christopher Udayan
Poornima Vijay
Simon Mark Vlies
Deepika Vunnam
Deshani Dimalika Walisinghe
Chamini Hasitha Weerasuriya
Jonathan James Wilkes
Alex Willsher
Ei Shwe Win
Yuen Sze Sivia Wong
Antesh Yadav

Infection

Vanesa Anton-Vazquez
Eman Ayaz
Frances Edwards
Leonard Farrugia
Farhan Fazal
Rodric Francis
Lydia Gale
Stuart Gallacher
Eliza Gil
Dominic Haigh
Katherine Hill
Alyssa Hudson
Raqib Huq
Kate Jackson
Durdana Parveen Jamal Khan
Timothy Peter Wynne Jones
Christopher Jones
John Kelly
Christine Kelly
Lok Hang Lee
Nathaniel Lee
Clare Leong
James Meiring
Jamie Murphy
Elizabeth Parker
Benjamin Patterson
Naomi Platt
Rachel Pringle
Simon Pybus
Sherika Lianne Consy Ranasinghe
Laila Sayeed
Ralph Schwiebert
Muhammed Sedig
Ruth Shorrocks
Eleanor Singer
Dominic William Sparkes
Vanessa Susan Taylor
Thomas Edward Taynton
Aye Thar Aye
Anastasia Theodosiou
Ameeka Thompson
Iona Willingham

Medical Microbiology & Virology

Ahmed Hamood Said Al-Mamari
Jasmine Buck
Yuan Yi Constance Chen
Wai Hin Chung
Ruth Cutajar
Rebecca Amy Dewar
Jaswinder Singh Gill
Lynda Hadjilah Fourali
Elaine Houlihan
Ashfaq Hussain
Amarjeet Kaur
Pascoe Ao Ting Lee
Ynolde Leys
Tanmay Mehta
Bridget Minihan
Niall O Mara
Rabia Sajjad
Mariam Sarwar

Oral Pathology

Priya Radia

Toxicology

Simon Peter Craige

Transfusion Science

Laura Eastwood
Chloe George
Alison Muir
Shane Grimsley

Veterinary Clinical Pathology

Daniel Castillo

Successful candidates for the Part 2 Examination

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

Clinical Biochemistry

Maya Al-Shidhani
Angela Ballantyne
Emily Bate
David Simon Church
Allan Dunlop
Mfon Ewang
Kate Elizabeth Fenna
James Michael Hawley
Chun Yiu Law
Rebecca Powney
Gemma Purcell
Edmund Rab
Christopher Reeves
Aidan Ryan
Julie Tarling
Sally Thirkettle
Andreas Tridimas
John Wadsworth
Matthew Whitlock
Sasala Roshinie Wickramasinghe

Forensic Pathology

Sam Hoggard
Tracy Sorkin

Genetics

Stephanie Jane Barton
Kevin Colclough
Drew Ellershaw
Philippa Charlotte May
Jonathan Peter Williams

Haematology

Manoja Dhammini Abhayawickrama
Maria Zahid Ahmed
Ahmad Alsaiedi
Ferras Alwan
Chris Armstrong
Hulda Asbjornsdottir
Saket Badle
Edward Bataillard
Sarah Beverstock
Frances Buckley
Kieran Richard Burton
Luke Carter-Brzezinski
Josh Coats
Philip David Crea
Joel Cunningham
Dassanayake Mudiyanselage H M K Dassanayake
Dissanayake M U P Dissanayake Karunathilake
Kushani Ediriwickrema
Uzma Farah Faruqi
Anne Fenech
David Foldes
Nicholas Fordham
Lee Grimes
Dinusha Chathurani Herath Mudiyanselage
Hwai Jing Hiew
Alexandra Holyome
Dr Matthew Horan
Samantha Hughes
Israa Ibrahim Kaddam
Ahmad Khoder
Neeraj Kohli
Muhammad Khan Khakwani
Rachel Anne Lacey
Alexander Langridge
Heather Leary
Francesca Leonforte
Katherine Lindsay

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Rebecca Ling
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Srividhya Senthil
Dale Seviar
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Rosina Shujaat
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Sarrah Tayabali
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Melanie Willcocks
James Wilson
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Catherine Zhu

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Cathal O'Brien
Paula Sylvia Waits

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Aled Daniels
Robert James Goldspring

Paediatric Pathology
Mohammad Hadi Hafiy Bin Haji Haini
Sadia Zafreen

Reproductive Science
Alison Campbell

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Veterinary Clinical Pathology
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Guy Davies
Milena Firmanty-Tancock

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Alexandra Lucy Jane Rivett
Kin Ho Sze
Thomas Whitfield

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Successful candidates for the Certificate Examinations

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

Daniela Catargiu
Sam Nicholas Pooley Cook
Gréta Galambosi
Muhammad Zain Mehdi
David John Mooney
Rebecca Elizabeth Mulholland
Sarah Elizabeth Joan Mullins
Naoimh O'Farrell
Nataliya Piletska
Sophie Prendergast
Emma Spoor

The following candidates have passed the Combined Infection Certificate Examination:

Darryl Braganza Menezes
Xin Hui Chan
James Cheaveau
Melissa Chowdhury
Sarah Annabel Clifford
Katherine Cobb
Adam Gray
Daniel Edwin Greaves
Ali Khan
Emer Kilbride
Hugh Kingston
Paul Morris
John Quartey
Sion Williams

The following candidates have passed the Certificate in Medical Genetics:

Esther Dempsey
Catherine Dennis
Elizabeth Forsythe
Joanna Kennedy
Jenny Patterson
Schaida Schirwani
Sivagamy Sithambaram
Shereen Tadros
Ian Tully

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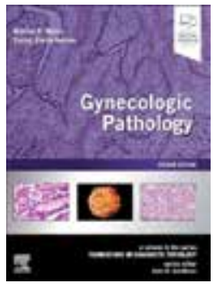
REVIEWS



BOOK REVIEW Gynecologic Pathology

By Marissa Nucci
Elsevier, 2020

£146.99, 1,040 pp, hardback
ISBN: 978-0323-35909-2

I was offered the opportunity to review this book (now in its second edition) and I'm extremely glad I accepted. It is an excellent textbook for someone new to the discipline, and at the same time it has enough meat for more experienced pathologists to get their teeth into.

What delighted me the most about the book was the easy-to-follow layout, with text that is clear, concise and comprehensible. There are no run-on paragraphs where you forget what you have read at the start by the time you reach the end. Each condition has its own subsection with a clear demarcation of the clinical and pathological features, ancillary studies and differential diagnosis, together with prognosis and therapy.

There are also the added bonuses of a separate 'fact sheet' and 'pathological features' boxes if you need a reminder of the important points in a hurry. The 'suggested reading' sections at the end of each chapter are also helpful for anyone wanting to delve deeper into the topic.

The accompanying histological pictures are large, numerous and of high quality throughout the book. There are also helpful practical diagrams for the beginner (e.g. the approach to estimating tumour size in cervical carcinoma), relevant summative tables (e.g. FIGO staging or classification tables modified from the World Health Organization) and differential diagnosis algorithm diagrams.

Of note, there is also a separate chapter on the topic of 'Immunohistochemistry and Molecular diagnostics', which is a new addition to this edition. This chapter is a welcome boon, highlighting the importance of immunohistochemistry for both diagnosis and prognosis, and the increasing integration of molecular diagnostics into everyday practice.

I only have two small items on my wish list for the next edition. First, I would like to see the inclusion of comprehensive immunohistochemistry tables across all chapters, similar to those in the specific chapter on this topic as highlighted above. Second, I would suggest reviewing the colours used for the section headers since the current blue and purple ones do not stand out as well as needed against the numerous histology pictures.

My overall impression is that this is a comprehensive, readable and logically laid-out book that provides a solid foundation to the subject. The physical textbook also comes with access to a complimentary electronic copy, which is available via Elsevier's website or the Inkling app. This is fantastic for quick reference or for preparatory reading when travelling to courses. I would certainly recommend this to anyone wanting a new gynaecological pathology textbook.

Dr Fionnuala Hinds
ST7 Histopathology
Royal Victoria Hospital, Belfast

BOOK REVIEW Health Is Made At Home. Hospitals Are For Repairs

By Nigel Crisp
SALUS Global Knowledge Exchange, 2020

£9.99, 257 pp, paperback
ISBN: 978-1838-03130-5

One of the many lessons of the COVID-19 pandemic has been the critical role of socioeconomic factors in determining both susceptibility to and severity of disease. This is the most recent illustration of the role of social determinants of health in which adverse socioeconomic conditions – such as poor education, poor housing and work insecurity – are associated with premature death.

The diseases causing these premature deaths are now approaching epidemic proportions, so there is a need to reverse the imbalance between health and disease. Addressing the underlying socioeconomic factors in the home environment will do this, hence the title of the most recent book by Lord Crisp: *Health is Made at Home. Hospitals are for Repairs*.

The book is in three parts. The first part introduces the various socioeconomic factors that engender disease and discusses how addressing them will, by encouraging health, reduce disease. But this is more than just prevention of disease. The processes enhance and broaden people's lives, with individuals and communities actively taking more control of their circumstances and achieving greater fulfilment.

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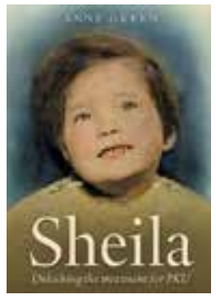
The second part provides many examples of activities influencing health across the UK: businesses in the City taking action to reduce mental stress, individualised education (especially outdoors) rehabilitating excluded children, the elderly learning new skills and making new friends, community activity based around food to give people a common identity and sense of purpose, and so on. Common themes are social engagement, a sense of purpose, physical activity and a positive attitude. The magic in this approach is that it creates good health while reducing disease.

Although this is very much a global issue, in the last part, as a former CEO of the NHS, Lord Crisp focuses on what this means for the NHS and UK government. For the NHS (traditionally a centralised, command-and-control organisation), a big challenge is how to work effectively with these new external entities and their ethos of individuals creating and controlling their own health. For the government, at the policy level, the challenge is to focus more on the social issues and less on the economic factors.

What is the relevance of this topic for pathologists? As individuals, we all use health services, and as professionals, we all work in health services. As the increasing move to a more societal view of healthcare will impact us all, it is vital to understand what is involved. This book provides an excellent primer.

Kenneth A Fleming
Emeritus Fellow
Green Templeton College, University of Oxford



BOOK REVIEW Sheila: Unlocking the Treatment for PKU

By Professor Anne Green
Brewin Books, 2020

£12.95, 192pp, paperback
ISBN: 978-1858-58714-1

Sheila: Unlocking the Treatment for PKU is a wonderful, moving book by Professor Anne Green. The book tells the poignant story of Sheila Jones, diagnosed with phenylketonuria (PKU) in 1951 at age two, and her mother Mary's tenacity, love and personal sacrifice in finding a treatment to help her daughter.

Green guides the reader through the uncovering of the mystery behind treating PKU, combining interview data with contemporary witnesses, documents and pictures. She describes to us the personalities behind the story, including biographies of Sheila herself, her mother, Mary, her four brothers, and the lead developers of the treatment – Evelyn Marion Hickmans and John Watson Gerrard, and chromatographers Tom Day and Horst Bickel – not forgetting the laboratory staff and nurses.

The reader is led through the history of paediatrics, starting from the beginning when parents were only allowed to visit their child in hospital once a fortnight for one hour. We learn about an almost unbelievable constellation of dedicated professionals at Birmingham Children's Hospital, who would relent to a poverty-stricken, immigrant Irish single mother, trying to change the fate of a genetic disorder in her daughter.

It interweaves Sheila and her family's story with a fascinating historical and scientific account of the life-changing discovery of the first treatment for PKU through the pioneering and collaborative work at Birmingham Children's Hospital in the early 1950s.

The book is an important publication in the history of PKU. It tells of Sheila's immense contribution and how she laid the foundations to improve the health and outcomes for individuals with PKU. Although Sheila herself, sadly, did not benefit in the long term, she left a lasting gift to all those with PKU.

The book will have a wide interest, appealing to health professionals, individuals with PKU and their families, and those with an interest in medical and social history.

Dr Grainne Connolly
Consultant Chemical Pathologist
Belfast Health and Social Care Trust

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BOOK REVIEW Diagnostic Histopathology of Tumours, Fifth Edition

By Christopher DM Fletcher
Elsevier, 2019

£278.48, 2,440pp, hardback
ISBN: 978-0323-42860-6

'In no area of anatomic pathology does the pathologist play a more important and crucial role than in the diagnosis of tumours' begins the 5th edition of Fletcher's *Diagnostic Histopathology of Tumours*, a textbook well known to many pathologists. But, does this weighty tome also play its own important role?

Six years have passed between the 4th and 5th editions of Fletcher's textbook and, while the format remains broadly similar, it has been significantly updated and modernised with some chapters (Lung and Pleura) completely rewritten. Arranged as two volumes, the book begins with an introductory chapter by the editor and is then organised by organ system into 29 further chapters, before closing with an overview of the application of 'modern techniques' in pathology. It is a format that works and the book is well-presented and easy to navigate, although I personally felt too many font types were used by the publishers, leading to a slightly incohesive feel overall.

Discounting typeface, the book is otherwise aesthetically pleasing and is beautifully illustrated with innumerable full-colour images, tables and charts. While most of these are photomicrographs, there are also many gross photographs and boxes displaying classifications and other key information. I found the use of tables highlighting 'diagnostic clues' to be particularly useful, especially in challenging areas like salivary gland tumours, in which entities overlap in their appearance and the potential for misdiagnosis is high.

Overall, the writing style is clear and concise, and the editor and 62 expert contributors should be congratulated for presenting detail that is in-depth yet never feels overwhelming or unnecessary. This edition includes staging information from the TNM8 systems and many of the updated WHO 'blue book' classifications are presented in the text or in table format. However, pathology moves quickly and in some areas this edition already feels dated; for example, there is no mention of the new molecular classification of endometrial carcinoma, and some of the updated entities in the WHO soft tissue classification receive barely a mention in their relevant sub-sections. This is not something that is easily rectified, however, and where this book really does stand the test of time is in its exact morphological descriptions and interweaving of histological features with key clinicopathological information.

As an academic trainee, I particularly like the use of extensive referencing, guiding the reader to the original literature and providing a 'one-stop shop' for research about a particular entity. While this certainly adds to the page count of this book (over 2,400 in total), it feels necessary in this era of molecular diagnosis when the practicing pathologist needs to keep abreast of recent developments in their field. I hope that those using the e-version find the references equally as easy to navigate and access.

In summary, this is an excellent textbook that will be useful to most, if not all, general pathologists. Trainees will find the chapters on soft tissue and lymphoreticular pathology (areas covered poorly in other multispecialty textbooks) particularly comprehensive. It remains my 'go-to' as a source of information about unknown tumours, which seem to come up with disconcerting regularity in our local FRCPath revision sessions.

Dr Kathryn Griffin
Specialty Registrar/Clinical Lecturer
Leeds Teaching Hospitals Trust

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LETTER

Reply to Reporting of race in autopsy reports – time to review?

Dr Esther Youd

I read with interest the letter from Professor Lucas in the July Bulletin regarding the inclusion of race in autopsy reports and this issue was discussed by members of the College Diversity and Inclusion Advisory Group. Those who responded were a mixture of pathologists (some histopathologists, some other disciplines) and College staff (i.e., essentially lay people).

The respondents without a histopathological background, both medics and College staff, were somewhat surprised at the inclusion of skin colour descriptions in an autopsy report and asked why it was necessary.

Histopathologists, on the other hand, recognised that ethnicity may be helpful in identification and disease risk stratification. They also thought that getting it wrong is a potential cause of distress to the deceased's family.

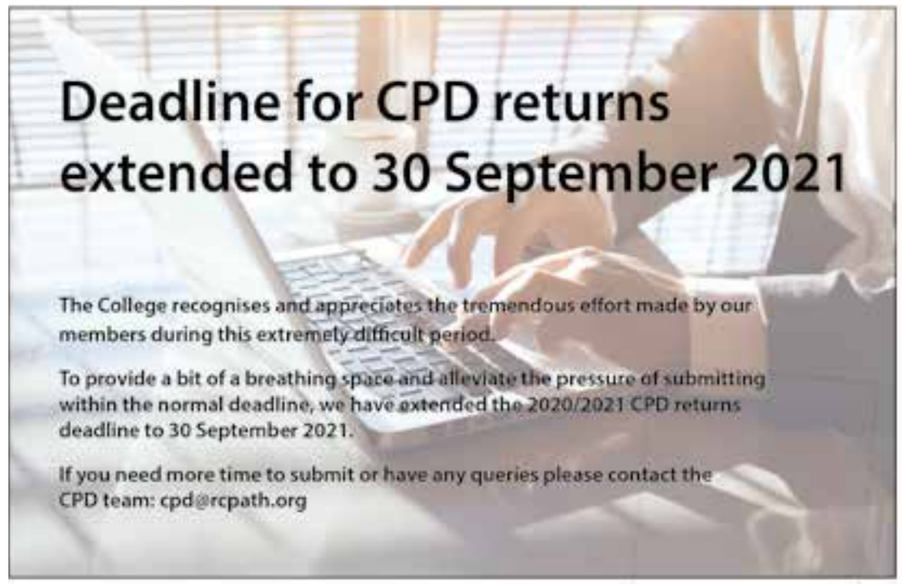
Overall, the strongest view was that, if ethnicity is to be included in a report, it should be the ethnicity which the deceased had self-declared in life.

'My desire would be that my self-declared ethnicity was recorded, since that's how I identified when alive,' one advisory group member said.

People recognised that ethnicity is not always straightforward to determine simply by looking at another person: 'Many people are also a mixture of races nowadays, with more widespread intermarrying. Also, as there is some correlation of certain pathologies with race and ethnicity, who better to know what stock a person hails from than the person themselves?'

Since starting this conversation, I have noticed that the police reports provided to me from the procurator fiscal do indeed include the self-declared ethnicity of the deceased, presumably from the GP. When someone registers with a new GP, they are asked to complete a diversity monitoring form. So, I have stopped describing skin colour in my autopsy reports in favour of providing the deceased's stated ethnicity. This may be the most sensitive and appropriate way forward in cases where this information is available to pathologists.

Dr Esther Youd
Consultant Pathologist
University of Glasgow



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NOTICEBOARD

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 grass roots 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)

Workforce details online

Calling all UK consultants or consultant equivalents – we need your help to collect workforce details to ensure that workforce planning is evidence-based and robust.

This allows the College to better advise the Department of Health, Health Education England, NHS Wales, NHS Scotland, HSC Northern Ireland and other relevant bodies on your behalf to sustain the pathology workforce.

The survey should take you less than five minutes.

Thank you for your cooperation.

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College conferences

23 JULY 2021

College online learning programme: Implementation guidance for carcinomas and mucinous neoplasms of the appendix

COLLEGE CONFERENCE WEBINAR

24 SEPT 2021

Medical Examiner Officer (MEO) Face to Face - Virtual Training

COLLEGE CONFERENCE

29 SEPT 2021

Medical Examiner (ME) face to face training session- Virtual Training

6 CPD CREDITS COLLEGE CONFERENCE

To see all 2021 conferences visit our website.

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CPD-accredited events

3 July to 10 Sept 2021	Blood cell morphology webinar series	6 CPD CREDITS · EXTERNAL EVENT
20 JULY 2021	Webinar: Diagnostic driven strategies for antimicrobial resistance in the UK	2 CPD CREDITS · EXTERNAL EVENT
21 JULY 2021	COVID: Can we test our way back to normal?	1 CPD CREDIT · EXTERNAL EVENT
13 SEPT 2021	BAUP Advanced Prostate Pathology Course	15 CPD CREDITS · EXTERNAL EVENT
17 SEPT 2021	2021 General Pathology Conference	7 CPD CREDITS · EXTERNAL EVENT
20 SEPT 2021	BAGP Long Course	36 CPD CREDITS · EXTERNAL EVENT
27 SEPT 2021	Infection Prevention 2021	17 CPD CREDITS · EXTERNAL EVENT
13 Nov 2021 to 30 July 2022	30 Webinars in the EOE (Season2)	50 CPD CREDITS · EXTERNAL EVENT

RCPath CPD accredited online resources can be found here

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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 & 8 September
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
Trainee Grant Funding Scheme in Morpho-Molecular Pathology	1 October
Trainees' Small Grants Scheme	1 April & 1 October
Visiting Fellowships	1 April & 1 October
TRAVEL GRANTS	
Pathological Society Meeting Bursaries	31 May & 31 December
Pathological Society Meeting Bursaries for undergraduate	31 May & 31 December
Travel & Conference Bursaries	Open
JEAN SHANKS/PATHOLOGICAL SOCIETY (JSPS) RESEARCH GRANTS	
Pre-Doctoral Research Bursary	1 April & 1 October
Clinical PhD Fellowship	1 April & 1 October
Clinical Lecturer Support Grant	1 April & 1 October
Intermediate Research Fellowship	1 April & 1 October
Clinical Lecturer Grant	1 April & 1 October
Clinical Academic Research Partnership (CARP)	1 April & 1 October
OTHER GRANTS	
Open Scheme	1 March, 1 June, 1 September & 1 December
Pathological Society Meetings Bursaries	31 May & 31 December
Public Engagement	1 March, 1 June, 1 September & 1 December

Full details are available on our website: www.pathsoc.org or from:
Julie Johnstone, Deputy Administrator, Pathological Society of Great Britain and Ireland. E: julie@pathsoc.org
4th Joint Winter Meeting of the Pathological Society & The Royal Society of Medicine
25–26 January 2022 (Meeting Format to be confirmed)
Due to the COVID-19 crisis, grant deadlines may be changed and/or rescheduled. Please refer to our website for updates.

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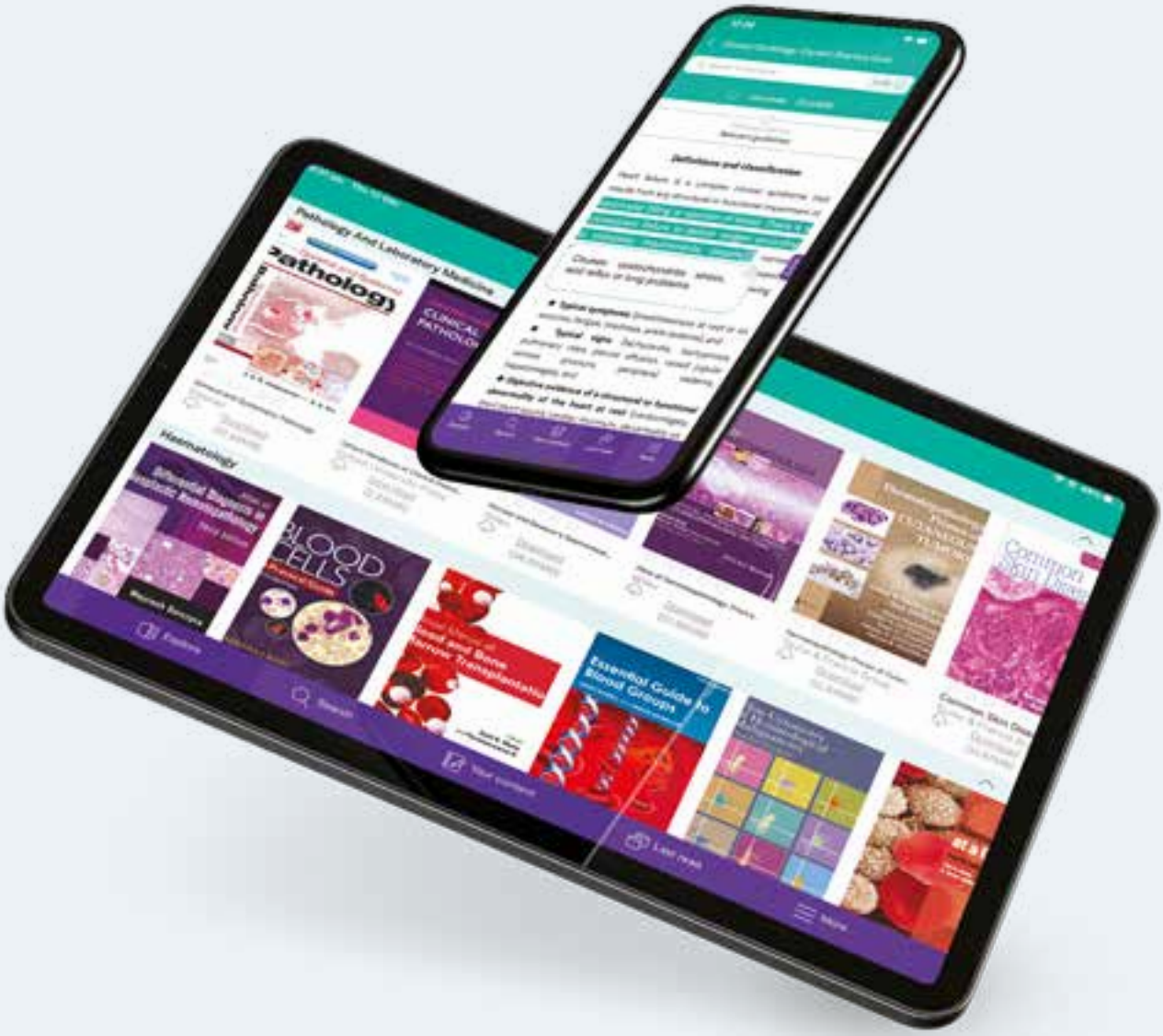

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