National Blood Transfusion Committee and NHS Blood and Transplant

Transfusion 2024

Setting a 5-year strategy for clinical and laboratory transfusion practice




Tuesday 26 March 2019 at the Royal College of General Practitioners, London

PROGRAMME DETAILS

09:15 **Registration and Coffee**

10:00 **Welcome**
Prof Keith Willett, Director for Acute Care, NHS England

SESSION 1:

Patient Blood Management (PBM)
Chair: Prof Keith Willett and Dr Shubha Allard

A multidisciplinary evidence based approach to improving the care of patients

10:10 **Improving blood transfusion: what have we achieved?**
Dr Jonathan Wallis, Consultant Haematologist, Chair, National Blood Transfusion Committee

10:25 **An international perspective**
Prof Erica Wood, President Elect, International Society of Blood Transfusion

10:45 **Resources needed for implementation of PBM in hospitals**
Ms Wendy McSporran, Advanced Transfusion Practitioner, Royal Marsden NHS Foundation Trust

11:00 **Is PBM accreditation needed?**
Prof Mike Murphy, Consultant Haematologist President, American Association of Blood Banks

11:15 **Discussion**

SESSION 2:

Transfusion Laboratory Safety
Chair: Dame Sue Hill and Dr Paula Bolton-Maggs

11:30 **Transparency, safety and efficiency**
Prof Mark Bellamy, Chair, Serious Hazards of Transfusion

11:45 **Laboratory challenges and action needed**
Mr Stephen Bassey, Chair, Transfusion Laboratory Managers' Working Group

12:00 **NHSBT support for hospital laboratories**
Dr Mark Williams, Head of Red Cell Immunohaematology, NHS Blood and Transplant

12:15 **Discussion**

12:30 **Lunch**

SESSION 3:

Harnessing Technology and Innovation
Chair: Prof Jo Martin and Prof Erica Wood

13:30 **Use of Big Data in Transfusion**
Dr Nick Watkins, Assistant Director – Research and Development, NHS Blood and Transplant

13:45 **New Blood Component development to support patient need**
Dr Rebecca Cardigan, Head of Components Development, NHS Blood and Transplant

14:00 **Donor genotyping from research to practice**
Prof Dave Roberts, Associate Medical Director, Blood Donation, NHS Blood and Transplant

14:15 **Discussion**

SESSION 4:

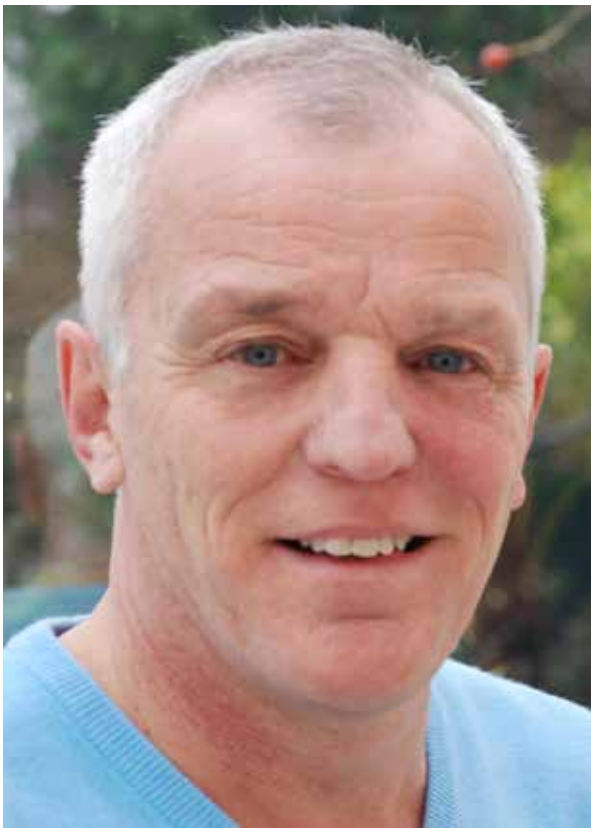
Transfusion and the wider NHS
Chair: Dr Jonathan Wallis and Dr Alwyn Kotze

14:30 **Priority for Patient Safety and the NHS**
Mr Wayne Robson, Head of Patient Safety – Cross System Development, NHS Improvement

14:40 **Expert panel discussion – Influencing and changing practice**
Including representatives from NHS England, RCPath, NHSBT, NHS Improvement and NHS Commissioning

15:30 **Concluding remarks and next steps**
Dr Jonathan Wallis, Consultant Haematologist, Chair, National Blood Transfusion Committee

WELCOME 10:00



PROFESSOR KEITH WILLET
CBE, FRCS, FRCS(ED)

Director of Acute Care
NHS England

Professor Keith Willett is the Strategic Commander for EU Exit for the NHS and Medical Director for Acute Care and Emergency Preparedness to NHS England; he is the Professor of Orthopaedic Trauma Surgery at the University of Oxford. An NHS consultant surgeon for 25 years he has extensive experience of trauma and emergency care, driving service transformation and healthcare management. He has taught surgery, urgent care service transformation and medical leadership extensively across the NHS and internationally in developed and low income countries. He was deployed by government as a civilian surgeon in both Afghanistan and Libya to lead the medical evacuation of casualties.

In 2003 he founded the Kadoorie Centre for Critical Care Research at the John Radcliffe Hospital Oxford focusing on the treatment of critically ill and injured patients; he still leads an active research programme in musculoskeletal injury and recovery.

He was the co-founder of the unique 24-hour consultant-resident Trauma Service at the John Radcliffe Hospital in Oxford in 1994. Building on that model, in 2009 he was appointed the first National Clinical Director for Trauma Care to the Department of Health and was charged with developing and implementing government policy across the NHS to radically improve the care of older people with fragility hip fractures and to establish Regional Trauma Networks and Major Trauma Centres. By 2012 both re-organisations and care pathways were successfully in place and are now credited with marked improvement in patient care and survival.

In his current role, he has the national medical oversight of acute NHS services ranging from pre-hospital and ambulance services, emergency departments, urgent surgery, acute medicine, critical care, defence medical services, children's and maternity care, and national major incidents and terrorism. He leads the programme to transform urgent and emergency care services across the NHS in England and to modernise services for stroke patients.

IMPS, a children's safety charity he launched 24 years ago in Oxford, has trained over 500,000 children in risk awareness, first aid and life support. He was awarded a Commander of the Order of the British Empire (CBE) in the New Years Honour's List in 2016 for services to the NHS.

SESSION 1:

PATIENT BLOOD MANAGEMENT (PBM)

Chair Prof Keith Willett and Dr Shubha Allard

A multidisciplinary evidence based approach to improving the care of patients

DR SHUBHA ALLARD MD FRCP FRCPATH

Consultant Haematologist, Barts Health NHS Trust and NHS Blood and Transplant

Clinical Director for NHSBT Patient Blood Management Consultants' Team and Secretary National Blood Transfusion Committee. Lead Consultant in Transfusion across the merged Barts Health NHS Trust.

Actively involved in undergraduate and postgraduate education and training. Chair of the British Society for Haematology Guidelines Committee developing UK guidelines. Board member of the International Society of Blood Transfusion.

10:10 Improving blood transfusion: What have we achieved?

DR JONATHAN WALLIS

BA OXON., MB.BS LOND., FRCPATH

Consultant Haematologist at Freeman Hospital Honorary Senior lecturer at Newcastle University

I trained at Oxford, Westminster, Exeter and Newcastle. I have been a consultant since 1990 in Newcastle upon Tyne.

I am both a clinical and laboratory haematologist with a particular interest in transfusion. My publications include studies on leucodepletion and infection, TRALI, long-term survival after transfusion, 'Where does blood go' and the physiological effects of transfusion.

I am Associate Editor of Transfusion Medicine, a previous President of the British Blood Transfusion Society. I have sat on a number of national transfusion related committees and am the current chair of the National Blood Transfusion Committee (England).

Red cell issues rose steadily during the 1990s reaching a peak of 2,250,000 units in the year 2000. Subsequently they have shown a progressive fall to 1.5million in 2018 such that we are now at levels 30% below the year 2000.

What has stimulated this change?

We do know that much of this fall has been in surgical practice (1), for example, whereas a majority of hip replacements were accompanied by transfusion in 2000, now less than 15% are transfused. There are many factors that have helped the change but perhaps the most important is clinical research. One of the first major randomised studies in blood transfusion, the TRICC trial, published in 1999 showed that restrictive transfusion was certainly no worse than liberal transfusion with the suggestion that may in fact be better for patients (2). This study was in ITU patients many of who were post-operative. It seemed therefore that less transfusion was needed for safe patient care.

How was the change achieved?

By education and audit. The NBTC held a number of symposia over the years linked with widespread education, anaesthetic and haematological guidelines and regular audit. All of these were implemented at a local level through the development of hospital based Transfusion Practitioners which together with the NHSBT clinical input have I believe been crucial to the success of the programme.

Is it good medicine?

Following the TRICC data subsequent randomised controlled studies such as FOCUS, Tripicu and TOPPS (3,4,5) have re-iterated the safety of restrictive transfusion regimes.

Is it cost effective?

At the current price of £129 per red cell unit the saving nationally for red cells alone compared to 2000 is £96 million per year for an investment in staff of around £1-2 million pa. In addition to promoting appropriate use, TPs have also been instrumental in safety improvements stimulated and documented by Serious Hazards of Transfusion (SHOT).

How can we maintain and improve on this?

Through continued focussed work and supported by data on 'where does blood go?' Critical to this is good continuing clinical research and the role of the Transfusion Practitioner. These vital posts must be maintained and are essential for ensuring safe and appropriate transfusion practice across hospitals.

Tinegate, H., Chattree, S., Iqbal, A., Plews, D., Whitehead, J., Wallis, J. P., & Northern Regional Transfusion Committee. (2013). Ten-year pattern of red blood cell use in the North of England. *Transfusion, 53(3), 483-489*.

Hebert, P. C., Wells, G., & Blajchman, M. A. (1999). Transfusion requirements in critical care investigators, Canadian critical care groups. *N Engl J Med, 340(6), 409*.

Lacroix, J., Hébert, P. C., Hutchison, J. S., Hume, H. A., Tucci, M., Ducruet, T., ... & Joffe, A. (2007). TRIPICU investigators; Canadian critical care trials group; pediatric acute lung injury and sepsis investigators network. Transfusion strategies for patients in pediatric intensive care units. *N Engl J Med, 356(16), 1609-19*.

Carson, J. L., Terrin, M. L., Noveck, H., Sanders, D. W., Chaitman, B. R., Rhoads, G. G., ... & Macaulay, W. (2011). Liberal or restrictive transfusion in high-risk patients after hip surgery. *New England Journal of Medicine, 365(26), 2453-2462*.

Stanworth, S. J., Estcourt, L. J., Powter, G., Kahan, B. C., Dyer, C., Choo, L., ... & Norfolk, D. (2013). A no-prophylaxis platelet-transfusion strategy for hematologic cancers. *New England Journal of Medicine, 368(19), 1771-1780*.

SESSION 1:

10:25 | An international perspective

PROFESSOR ERICA WOOD

President Elect, International Society of Blood Transfusion

Erica Wood is Head of the Transfusion Research Unit at Monash University in Melbourne, and a consultant haematologist at Monash Health. She holds an honorary appointment at the Peter MacCallum Cancer Centre.

Erica is the current President of the International Haemovigilance Network, President-elect of the International Society of Blood Transfusion, past-President of the Australian and New Zealand Society of Blood Transfusion, and member of WHO's Expert Advisory Panel on blood safety. Erica served as Chief Examiner (Haematology) for the Royal College of Pathologists of Australasia.

She is a founding member of the Victorian Blood Matters Program advisory committee, established in 2001 to support implementation of patient blood management, and chaired its Serious Transfusion Incident Reporting program. Erica was awarded a Churchill Fellowship in 2014 to support her work in PBM.

An International perspective

Patient Blood Management (PBM) is "an evidence-based, multidisciplinary approach aimed at optimising the care of patients who might need transfusion".[1] PBM is now well established internationally as best practice in transfusion medicine, supported by the World Health Organization and many national societies and other organisations.[2]

While many reports have focussed primarily on efforts to reduce perioperative transfusions in elective surgery, and excellent work has been done in this context, the aims and scope of PBM are much broader.[3] Similarly, while information on trends of units of blood transfused are useful, they do not give the full picture of the impact of PBM. Importantly, clinical outcome measures, including those important to patients such as quality of life and functional outcomes, and health economics analyses, are often lacking. Furthermore, a recent international consensus conference reviewed the evidence base for PBM relating to red cell transfusions, and identified many gaps which deserve further research, including in implementation of PBM programmes.

Approaches to PBM implementation, and measures of success, have varied greatly around the world. Some of the most successful appear to be regional or national efforts linked closely with quality and safety initiatives, and with engagement at every level including individual patients, hospitals and clinicians as well as health service managers, blood services and governments.[4] The transfusion practitioner role has been key to initiating and maintaining hospital PBM activities in many countries, including Australia.[5]

Although PBM is now accepted and established in many places, even developed countries frequently still lack robust and coordinated PBM programmes. In many low- and middle-income nations, where either safe blood is not available or available blood is not safe, PBM can have enormous impact; supporting its uptake in these settings is an international priority.[1,2]

Many challenges remain, including further developing the PBM evidence base, strengthening links between PBM and other areas of transfusion medicine, including haemovigilance, and securing sustainable resources for PBM programmes.

[1] International Society of Blood Transfusion. Patient Blood Management: www.isbtweb.org/working-parties/clinical-transfusion

[2] World Health Organization. WHO Global Forum for Blood Safety 2011: Patient Blood Management. Concept paper available at: www.who.int/bloodsafety/events/gfbs_01_pbm_concept_paper.pdf

[3] Yazer M. H., Waters J. H., What in the world of transfusion medicine isn't patient blood management? *Transfus Med 2018;28(2):89-91.*

[4] Murphy M. F., Waters J. H., Wood E. M. and Yazer M. H., Transfusing blood safely and appropriately. *BMJ 2013 Jul 16;347:f4303.*

[5] Miller K., Akers C., Davis A. K., Wood E. M., Hennessy C. and Bielby L., The evolving role of the Transfusion Practitioner. *Transfus Med Rev 2015; 29(2):138-44.*.

SESSION 1:

10:45 | Resources needed for implementation of PBM in hospitals

MS WENDY McSPORRAN

Advanced Transfusion Practitioner,
Royal Marsden NHS Foundation Trust

Wendy is a registered nurse with 26 years' experience which has incorporated working across several specialities before focusing on haematology and transfusion. The last 14 years of my career have been as a Transfusion Practitioner (TP), the first post as a TP was at a large teaching hospital covering three hospital sites including maternity and trauma services. I am currently a TP at a specialist cancer hospital.

My interest in guidelines and how they are implemented in clinical practice, including how transfusion decisions are made and influenced, arose shortly after coming into post. This was due to a conversation at the end of a teaching session with a junior doctor who stated 'the teaching was good but if you put the information in my pocket in the format you used I would use it when I need it'. This one conversation has resulted in an on-going curiosity and study of transfusion decision making.

Resources needed for implementation of PBM in hospitals

Since the introduction of Patient Blood Management recommendations (PBM) hospitals have been surveyed to establish how well the recommendations have been implemented. The first survey in 2013 assessed how prepared hospitals were to implement the recommendations. The 2015 survey examined the progress within hospitals (Sherliker *et al*, 2018). Comparison of the surveys demonstrates that improvement has taken place in several areas, consent for transfusion, transfusion education, the introduction of policies to minimise blood sampling to prevent iatrogenic anaemia and use of tranexamic acid. However there are still areas that have been identified that have potential for improvement.

What resources are therefore required to drive the momentum of PBM? What are the barriers to effective implementation of PBM? The 2018 survey is still to be published but it will be interesting to note if there has been further progress.

One of the main staff groups crucial to the success of PBM is the Transfusion Practitioner (Bielby & Moss, 2018). However they, like many staff in the NHS, have competing priorities and are responsible for many other elements of transfusion practice such as patient safety and haemovigilance. So what is required to ensure enough resources for TPs and transfusion teams? What investment does the TP role require to meet the needs of PBM?

The survey 2015 highlighted the following areas as in need of further development and resource:

- IT solutions
- Support for audit and quality improvement
- Education and policies on anaemia management

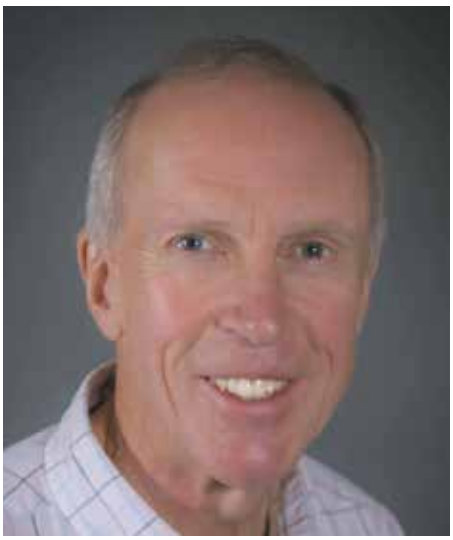
In addition, the evidence base for influencing medical decision making in relation to transfusion requires further research. This is essential to drive change in practice and to ensure the most effective use of resources. Transfusion Practitioners therefore require support in all areas to evaluate measures that result in effective change in transfusion practice.

Bielby L., Moss R. L., (2018) Patient blood management and the importance of the Transfusion Practitioner role to embed this into practice, *Transfusion Medicine, 28, pp. 98-106*.

Sherliker L., Pendry K., Hockley B., 2015 Survey of Patient Blood Management
Available at: http://hospital.blood.co.uk/media/28341/2015-survey-of-patient-blood-management.pdf
Accessed 20/02/19

SESSION 1:

11:00 | Is PBM accreditation needed?



PROFESSOR MICHAEL F. MURPHY
MD, FRCP, FRCPATH, FFPATH

NHS Blood and Transplant; Oxford University Hospitals NHS Foundation Trust; University of Oxford

Mike Murphy is Professor of Transfusion Medicine at the University of Oxford and Consultant Haematologist for NHS Blood and Transplant and Oxford University Hospitals.

He was a recipient of the British Blood Transfusion Society's Kenneth Goldsmith Award in 1994, and co-founded the NHSBT Clinical Studies Unit, the Systematic Reviews Initiative for transfusion medicine, the Transfusion Evidence Library (www.transfusionevidencelibrary.com), and the National Comparative Audit of Blood Transfusion programme in the early 2000s.

Professor Murphy was Secretary of the National Blood Transfusion Committee from its establishment in 2001 to 2015. He chaired the UK National Institute for Health and Care Excellence (NICE) guideline on transfusion published in November 2015. He was Chair of the international BEST Research Collaborative from 2014 to 2018 and is the current President of the American Association of Blood Banks (AABB).

Is PBM accreditation needed?

Patient Blood Management (PBM) is an evidence-based, multidisciplinary approach to optimising the care of patients who might need a blood transfusion. Despite significant improvements in transfusion practice in recent years, it is challenging for transfusion teams with limited resources to ensure that transfusions are only used when strictly indicated and measures to avoid their use are applied appropriately. Various approaches have been used to promote the implementation of PBM in hospitals; some such as education are only transiently effective and others with greater effectiveness such electronic decision support are not yet widely available.

A potential approach to encourage hospitals to implement PBM in a co-ordinated way is accreditation. Accreditation is a process for certifying competency; it is widely used in laboratory practice including in transfusion laboratories in hospitals. The American Association of Blood Banks (AABB) has developed a PBM certification programme having first published standards for PBM, and hospitals are assessed against these standards. There are 3 tiers of certification depending on the size and complexity of the hospital. The participation by hospitals in the programme was initially slow but is now accelerating.

The concept of PBM accreditation was presented to the National Blood Transfusion Committee (NBTC) in March 2016, but there was little appetite for its uptake. Concerns included uncertainty about who would lead and administer it in the UK, a lack of evidence of value over what our current PBM initiatives are already delivering, and that it would be complex and time consuming for hospitals.

An alternative approach to drive future PBM efforts would be to build on existing PBM initiatives by using the information from PBM surveys and/or other routinely collected data to benchmark hospitals on their implementation of PBM. For example, it could start with voluntary submission of data about the implementation by hospitals of the NICE Quality Standards for Blood Transfusion (published in 2016), and further rounds could include other measures of performance of the implementation of PBM. The NBTC could act as a central point for the process by setting the criteria and collating returns. Further consultation with hospitals is required to determine their willingness to participate, perhaps followed by the practicalities of the establishment of an initial pilot.

AABB Patient Blood Management Certification. http://www.aabb.org/sa/Pages/affiliated-accrediting-organizations.aspx
National Comparative Audit of Blood Transfusion. https://hospital.blood.co.uk/audits/national-comparative-audit/
NICE Guidelines for Blood Transfusion (2015). https://www.nice.org.uk/guidance/ng24
NICE Blood Transfusion Quality Standard QS138 (2016). https://www.nice.org.uk/guidance/qs138

SESSION 2:

TRANSFUSION LABORATORY SAFETY

Chair: Professor Dame Sue Hill and Dr Paula Bolton-Maggs

PROFESSOR DAME SUE HILL

DBE PHD DSC CBIOL FRSB HON FRCP HON FRCPATH

Professor Dame Sue Hill is the Chief Scientific Officer for England and the head of profession for the healthcare science workforce in the NHS and associated bodies, providing professional leadership and expert clinical advice across the health and care system. She is a respiratory scientist by background with an international academic and clinical research reputation.

Professor Hill has a broad portfolio of policy responsibilities and has led a variety of major system and workforce transformation initiatives for the Government to improve patient outcomes and service effectiveness in the NHS and beyond.

Sue is the Senior Responsible Officer for Genomics in NHS England, driving the programme to introduce a nationwide Genomic Medicine Service transforming care pathways across a wide range of clinical conditions. This builds on her work in leading the NHS contribution to the 100,000 Genomes Project. She also provides strategic leadership for the Health Education England Genomics Education Programme.

Sue was made a Dame Commander of the British Empire in the 2018 Queen's Birthday Honours in recognition of the scale of her contribution to British genomics.

DR PAULA H.B.BOLTON-MAGGS

FRCP, FRCPATH, DM

Medical Director of the Serious Hazards of Transfusion (SHOT) national haemovigilance scheme from 1 October 2011 to August 2018, and Honorary Senior Lecturer in the Department of Cardiovascular Medicine at Manchester University since 2003.

Paula was responsible for collation and analysis of the UK adverse incidents relating to blood transfusion which includes production the comprehensive annual SHOT reports (website www.shotuk.org) which include analysis of approximately 3500 incident reports made from NHS organisations in the UK (100% signed up to report) and she organised the SHOT national symposium each year. She led a team of 8 people and there work is assisted by a working expert group and a steering committee who represent all the Royal Colleges and specialty organisations across the UK. They contribute to many educational events nationally and internationally with at least 60 presentations annually. Paula received the Mollison award from the British Blood Transfusion Society in 2018 in recognition of her contribution to haemovigilance

Paula was secretary of the International Haemovigilance Network 2011 to 2018 and received the IHN Medal for my contribution.

SESSION 2:

11:30 | Transparency, safety and efficiency

PROFESSOR MARK BELLAMY

Professor of Intensive Care

Mark Bellamy is Professor of Intensive Care in Leeds, where he has been a consultant since 1993. His interest in transfusion was triggered by his involvement in liver transplantation and massive haemorrhage. He has chaired his hospital transfusion committee, and been a member of the National Blood Transfusion Committee, the National Commissioning Group for Blood, and the SHOT Steering Group of which he has been chair for the last 2 years. Outside of work he is a keen skier and holds a pilot's licence.

Transparency, safety and efficiency

"I want to know who is responsible" – CB, chairman of airport board of directors, but from a background of chairing a security company (two industries with very different cultures). The question may have been intended as meaning "who is to blame".

Aviation is often held up as an industry with a safety culture based on reporting, learning, and a just culture which means that this can be done without fear of recrimination. But was this, is this, always the case? Recent aviation investigations throw into contrast the learning process of a just culture, and the risk to this posed by an adversary legal system where there is a binary outcome, guilty or not guilty. In medicine, we are faced with similar societal attitudes. Safety is resource intensive. Transparency should not represent vulnerability or culpability. In medicine, as in aviation, this is not always the case. In this talk I will discuss recent Air Accident Investigation Branch reports against this background, and ask the question whether there are meaningful parallels with healthcare. In particular, what happens when the two systems (legal, safety) come into conflict? To what extent should information from one culture be available to the other? In aviation, his has recently (2016) been addressed in the high court. In healthcare, there may be a need for similar protection.

https://assets.publishing.service.gov.uk/media/5c73c02bed915d4a3d3b2407/S1-2019_N264DB_Final.pdf
https://assets.publishing.service.gov.uk/media/58b9247740f0b67ec80000fc/AAR_1-2017_G-BXFI.pdf
https://www.gov.uk/government/news/shoreham-high-court-judgement

SESSION 2:

11:45 | Laboratory challenges and action needed

STEPHEN BASSEY

Consultant Transfusion Scientist
for the Royal Cornwall Hospitals Trust

Stephen qualified in 1984 following which he specialised in transfusion medicine and has worked in both hospitals and NHSBT, currently holding down the role of Consultant Transfusion Scientist for the Royal Cornwall Hospitals Trust whilst also managing the overall Blood Sciences laboratory.

He represents hospital laboratories interests on various national groups and helps guide the commissioning of blood services with the DHSC.

He has a strong interest in the development and training of laboratory scientific staff and as a motorcyclist has a vested interested in ensuring transfusion practice is of the highest standard.

Laboratory challenges and action needed

Hospital Transfusion laboratories have faced some significant challenges over recent years. Workload has increased, the staffing profile has changed and the regulatory environment in which we work has altered.

Regulation has come to dominate the transfusion laboratory, firstly with BSQR, regulated by the MHRA, latterly with UKAS monitoring of ISO15189. Whilst there are some similarities in their requirements, the differences have added to the anxiety and workload.

The opportunity to deliver both operational and regulatory requirements is decreasing. The number of SHOT reports originating the laboratory continues to rise.

There are systemic failures at hospital level to address long-term staffing and resource issues. Vacancies in transfusion departments remain unfilled for years and the quality of applicants has declined. Experienced staff are leaving, often by either abandoning the profession or taking early retirement, leading to a knowledge and skill deficit.

Through Modernising Scientific Careers, the practitioner training programme (PTP) and scientist training programme (HST) were designed to build upon, replace and improve the old degree pathway, but has so far failed to live up to its promise. The higher specialist scientific training (HSST) has shown promise, but currently lacks significant buy-in at hospital level.

Nearly all laboratories removed these 'training' posts from their establishment, with the promise that new graduates would be experienced to perform the job. In the laboratory, there is limited capacity, or experience remaining to train those staff to help them progress in their career.

The 2017 SHOT report tells us the second largest cause of transfusion death was delay. Having a staff group that struggle, through no fault of their own, to grasp the basics on transfusion science in unlikely to help this.

We need to increase the skill set and background knowledge of transfusion laboratory staff. NHSBT have, through funding from HEE, supplied paid-for access to their excellent training courses for hospital laboratory staff. This help has been invaluable in helping develop our staff and needs to be expanded further.

Extending this collaborative relationship (and both parties can learn from this), involving hospital and RCI staff working together, resulting in more serology cases getting resolved in the hospital is the right networking solution for the future of transfusion science and practice.

SESSION 2:

12:00 | NHSBT support for hospital laboratories

DR MARK WILLIAMS

Head of Red Cell Immunohaematology, NHS Blood and Transplant

Mark has worked for the Blood Transfusion Service, now NHSBT, based in Leeds for over 36 years. For most of that time he has worked in Red Cell Immunohaematology, and is currently employed as national Head of RCI, with responsibility for 8 laboratories across England. His interests include flow cytometry in transfusion science, continuous improvement, and compliance. He was a member of the Special Advisory Group on Immunohaematology reporting to JPAC for 8 years and was a member of the writing group for current BSH guidelines on Pre-transfusion Testing and Estimation of Fetomaternal Haemorrhage. Increasingly his focus is on developing RCI's operating model to reflect the changing needs of the NHS.

NHSBT support for hospital laboratories

NHSBT has eight Red Cell Immunohaematology laboratories in England. Currently the laboratories process around 70,000 samples per year referred by transfusion laboratories and clinics from the NHS and the private sector. These investigations are for resolution of blood grouping and antibody problems which present in pre-transfusion testing, or in screening of women in pregnancy associated with the diagnosis and prevention of haemolytic disease of the fetus and newborn.

RCI's relationship with its service users is changing in that the numbers of referrals has significantly increased and types of referrals have changed, in particular the need for urgent turnround of results, and investigations required outside traditional core hours. These changes reflect movement in the wider NHS as clinical and patient expectations develop.

We are developing new services and products in response to requests from users. These include an new offer for antenatal screening, including microbiology screens, confirmatory testing of antibody specificity at low cost, screening for feto-maternal haemorrhage by flow cytometry, and recently a proof-of-concept exercise of electronic requesting and reporting between hospital and NHSBT LIMS.

Increasingly RCI's service users are requesting more radical changes to the services offered, reflecting their own changing need. This derives from the widely reported problems in achieving appropriate staffing with the correct skill mix in hospital transfusion laboratories. These requests include: remote interpretation of hospital laboratory investigation results; support with scientific and clinical advice, particularly outside core hours; an agreed algorithm for referral of sample to RCI; staff training and education; and support with compliance. There is also an expressed need for support for problem solving on hospital laboratories in areas of practice outside RCI's core skill set, including massive and emergency transfusions, and the use of non-red cell products. There is a need to align NHSBT's offer with the creation of pathology networks, by expanding skill sets, and availability of support for the full range of transfusion laboratory practice.

RCI has the capability to develop its support for hospital transfusion practice, but not, for the moment the capacity. This is in line with RCI's vision of the future relationship with the wider NHS, but if RCI are to help to meet this need, a radical review of structures, staffing, training and funding is required, to support safe and efficient transfusion practices across the NHS.

SESSION 3:

HARNESSING TECHNOLOGY AND INNOVATION

Chair: Prof Jo Martin and Prof Erica Wood

PROFESSOR JO MARTIN MA MB BS PHD MA FRCPATH

President of the Royal College of Pathologists

Professor Martin Qualified Cambridge University and London Hospital Medical College 1984, MRC Training Fellowship 1988, MRC Fellowship 1990, Wellcome Trust Advanced Research Training Fellowship 1991. PhD London University 1997. Kings Fund programme MA in Leadership in 2005.

Jo has over 130 published papers including Nature group and Science journals and is Professor of Pathology at Queen Mary University London. She is a founding Director of Biomoti, a drug delivery platform technology company, and app creator, including an elearning platform, eCPD, with over 46,000 modules completed by health staff.

She has very broad experience in healthcare management ranging from running clinical departments and divisions to acting as Medical Director, and subsequently Chief Medical Officer at Barts Health NHS Trust.

As Director of Academic Health Sciences she is responsible for CRN North Thames, hosted by Barts, and has led research across the Trust and the training and education of 16,000 staff across Barts Health. Her clinical specialist expertise is in the pathology of gastrointestinal motility disorders.

National Clinical Director of Pathology for NHS England April 2013-16, Jo has worked across a broad range of programmes and projects in all the pathology disciplines including genetics, transfusion, digital pathology, data, networks and working with the diagnostic professional bodies, including the Academy of Medical Royal Colleges.

She is involved in a range of bodies as a board member, including chairing the Research Advisory Board of the Motor Neuron Disease Association and chairing the Strategic Clinical Reference Group of the National Information Board.

Jo became President of the Royal College of Pathologists in November 2017.

SESSION 3:

13:30 | Use of Big Data in Transfusion

DR NICHOLAS A WATKINS BSC DPHIL MBA

NHS Blood and Transplants' Assistant Director for Research and Development

Nick is NHS Blood and Transplants' Assistant Director for Research and Development with responsibility for research strategy and research governance. NHS Blood and Transplant has a £10m research programme that supports its activities in blood transfusion, tissue engineering, stem cell biology and organ donation and transplantation. Nick obtained his PhD in Antibody Engineering from the University of York in 1996 and he has published over 100 research papers in the fields of antibody engineering, blood cell biology and immunology, transcriptomics, genomics and blood safety policy.

He has worked for the UK's Advisory Committee for the Safety of Blood, Tissues and Organs, completing work that led to changes in blood, tissue and organ donation policies. These included recommendations relating to variant CJD, the microbiological safety of cells, tissues and organs, as well as current blood donor selection policies relating to sexual behaviour.

He graduated with a First Class Honors degree in Molecular Biology and Biochemistry from the University of Durham in 1992 and obtained his MBA with distinction from the University of Cambridge in 2009.

Use of Big Data in Transfusion

Dr Nicholas A Watkins, Assistant Director – R&D, NHSBT, Cambridge
Ross D'Souza, Project Manager – Big Data, NHSBT, Cambridge

Observations – the collection and interpretation of data – have forever been at the heart of medical progress. This progress, driven by our ability to analyse the available data, faces new challenges in the modern world as the volume and complexity of data increase at exponential rates.

The data generated by Karl Landsteiner in the early 20th century, which led to the discovery of the A, B and O blood group, were interpreted by a single physician with the tools available to him at the time. It was ground-breaking work and remains a foundation on which transfusion medicine practice is built upon.

We now live in a data-rich world where information, generated through observations, experimentation and routine activities, requires a fundamentally different analytical approach which has been called "Big Data". Electronic donor and patient records are key to improving transfusion medicine through a big data approach. Insights into how best to deliver transfusion medicine will require large, complex and unstructured datasets to be combined and analysed using artificial intelligence and machine learning.

For the first time, we have combined clinical, laboratory and transfusion data from patients across three NHS Trusts to generate one of the largest transfusion datasets. The data were extracted from Patient Administration Systems (PAS), Laboratory Information Management Systems (LIMS) and electronic transfusion systems. They represent nearly 750,000 patient episodes between 1st April 2016 and 31st March 2017 and have information on the transfusion of 91,410 components.

This combined dataset supported the development of *the number of blood components transfused per 1,000 bed days* as an enhanced comparator of blood use. It was used to demonstrate variation in both red cell utilisation (42.4, 40.4 and 49.5 units/1,000 bed days) and platelet utilisation (11.69, 7.76 and 11.66 units/1,000 bed days). Detailed information on component use, extracted from the combined dataset and analysed by diagnostic (ICD-10), procedure (OPCS-4) and healthcare resource group (HRG) codes, identified discrepancies in practice.

For example, in one centre, platelet usage for cardiac surgery was significantly higher than the other two centres (7.26% vs 2.82% and 2.37%). This unexpected observation supported an evidence-based challenge by the local patient blood management team of existing practice.

Challenges remain regarding the use of "big data" in transfusion medicine. Its effective application requires concerns around confidentiality to be addressed and data standards to be developed. For the AI and machine learning there is also the requirement to provide information when it is needed, in a user-friendly format and evidence-based. We are currently working on the development of a blood demand planning tool for the platelet supply chain which will use and automated AI approach. It will, for the first time, support the ongoing integration of hospital activity data with platelet collection activities increasing the alignment of hospital and blood operator information.

Edgren, G., *et al*., 2017. Association of donor age and sex with survival of patients receiving transfusions. *JAMA Intern Med v117*:854-860.

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Mehta, N. & Pandit, A., 2018. Concurrence of big data analytics and healthcare: A systematic review. *Int. J. Med. Inf.*, v114:57-65.

Pendry, K. 2015. The use of big data in transfusion medicine. *Trans. M*ed., v25:129-137.

Tinegate, H. *et al*., 2016. Where do all the red blood cells (RBCs) go? Results of a survey of RBC use in England and North Wales in 2014. *Transfusion* v56:139-145.

SESSION 3:

13:45 | New Blood Component development to support patient need

DR REBECCA CARDIGAN

Head of Components Development for NHS Blood and Transplant

Rebecca Cardigan is a Clinical Scientist working in Haematology since 1992, firstly at University College London in Haemostasis and then NHS Blood and Transplant. She is currently Head of Components Development for NHSBT, Deputy Director of the UK Joint Professional Advisory Committee and Affiliated Lecturer, Department of Haematology, University of Cambridge. Her main areas of scientific interest relate to the laboratory and clinical evaluation of major changes to blood component production and methods used to assess blood component quality. She has published nearly 100 papers in the area of haemostasis and transfusion. She received the BBTS Race & Sanger award in 2007 for an outstanding contribution to transfusion medicine. She is a member of the International Biomedical Excellence for Safer Transfusion (BEST) Collaborative and Safety Advisory Board for Hema-Quebec.

SESSION 3:

14:00 | Donor genotyping from research to practice

PROFESSOR DAVID ROBERTS

Associate Medical Director, Blood Donation and Deputy Director for the Blood and Transplant Research Unit for Blood Donation

David Roberts is a haematologist and research scientist. He is currently Associate Medical Director, Blood Donation and Deputy Director for the Blood and Transplant Research Unit for Blood Donation. The research work aims are: to develop rapid cheap and effective genotyping methods and advise on how to use blood cell and HLA genotyping of donors to benefit patients; to improve haemoglobin testing in donors by testing of blood counts and prediction of trajectory of haemoglobin in donors and; to understand implications of iron deficiency in donors and to mitigate clinical problems of iron deficiency in donors.

Donor genotyping from research to practice

David Roberts[1-3] on behalf of the Blood transfusion Genomics Consortium

1. NHS Blood and Transplant, Oxford Centre, Oxford University Hospitals, Oxford, UK.
2. Department of Haematology and BRC Haematology Theme, Radcliffe Department of Medicine, University of Oxford, Oxford, UK.

Background

NHS Blood and Transplant (NHSBT) collects over 7,000 units of whole blood per day to supply patients with matched transfusions. To ensure transfusion safety, it is critical to identify the blood group antigens of both donor and recipient. Approximately 5% of patients require blood matched for antigens beyond ABO and D. Serological methods for typing ABO, D, Cc, Ee and KEL use monoclonal antibodies, however, reagents for the minor blood groups are expensive, unavailable or unreliable. DNA-based identification of human blood groups has been used to overcome these limitations and its application has reduced rates of alloimmunisation in chronically transfused patients.[1] However, DNA-based methods have not been introduced widely in routine donor typing due to cost. Technological advances have further reduced costs bringing the development of comprehensive donor-typing arrays within reach. The Blood transfusion Genomics Consortium (BGC) has developed an array, capable of typing all red cell antigens, HLA class I and II and human platelet antigens (HPA).

A large-scale real-world validation study is required before the broad introduction in donor genotyping in routine matching. The UK Biobank Axiom array, already used on 650,000 UK citizens[2], was redesigned for donor typing. Three approaches were used to guide selection of DNA probes: i) Mining transfusion medicine knowledge (e.g. ISBT allele tables); ii) Inclusion of loci associated with donor health[3]; iii) Extraction of relevant coding variants with a frequency of >1 20,000 from large-scale genomic data. DNA samples from 5,000 NHSBT donors participating in the COMPARE study and 2,871 Sanquin donors participating in the DIS study were used for validation. Blood types for each donor were inferred from genotyping results using the bloodTyper algorithm[4] and concordance with clinical serological typing results was assessed.

Concordance between serological and genotypic antigen typing results was 99.9% (96,088 comparisons) for antigens where serological typing data was available. 83 of the 135 discrepancies were serologically negative and genotypically positive for a given antigen (K/k, Fy[a/b], Lu[a/b]), in all cases genetic variants known to modify or weaken antigen expression were detected, showing that genotyping has a better ability than serology for detection of variant weak-antigen expression. The remaining 52 discrepancies are being sequenced to resolve the complex genetic architectures at the *ABO*, *RH* and *MNS* loci underlying the non-concordance. Across 48 antigens for which serology was available from both NHSBT and Sanquin, 13.2 serological typing results/donor were available, in contrast, genotyping yielded 47.9

results/donor highlighting its application in high throughput donor typing using a single assay. Furthermore, genotyping data is available on an additional 224 clinically relevant blood group alleles, allowing identification of high-frequency antigen negative donors and typing of antigens for which no antibodies are commercially available.

Through the efforts of the BGC an affordable comprehensive genotyping platform, including the processes for automated quality assurance and generation of clinical reports, has been developed and validated. The results of this international collaboration provide opportunities to introduce fully-automated genotype-based donor typing in a safe and cost-efficient manner in NHSBT, Sanquin and other blood supply organisations.

Several operational challenges lay ahead. Nevertheless, application of the BGC typing array to a significant proportion of donor base will provide many opportunities to improve patient care. We will be able provide patients relying on frequent transfusions with optimally matched blood with the aim to reduce the serious hazard of patients becoming immunised against several antigens. With the same platform providing HLA and HPA typing we anticipate significantly improved procurement of platelet concentrates and indeed other blood products matched for HLA and HPA antigens.

[1] Dezan, M. R., *et al.*, **2017**, 10.1016/j.bcmd.2017.03.014
[2] Bycroft, C., *et al.*, **2018**, 10.1038/s41586-018-0579-z
[3] Di Angelantonio, E., *et al.*, **2017**, 10.1016/S0140-6736(17)31928-1
[4] Lane, W. J., *et al.*, **2018**, 10.1016/S2352-3026(18)30053-X

SESSION 4:

TRANSFUSION AND THE WIDER NHS

Chair: Dr Jonathan Wallis and Dr Alwyn Kotzé

DR ALWYN KOTZÉ

Consultant Anaesthetist at Leeds Teaching Hospitals NHS Trust

Alwyn qualified MBChB from Stellenbosch University, South Africa, in 1997. He completed his internship and a period as Community Service Medical Officer at Edendale Hospital, a large peri-urban hospital in KwaZulu-Natal that provides referral services to a population with high levels of deprivation. Alwyn then travelled to the UK to gain further experience, initially planning to stay for 2 years, which eventually became 18 years and counting.

Alwyn is now Consultant in Anaesthesia at Leeds Teaching Hospitals. As Clinical Lead for Planned Care, he oversees complex pathways for referral, work-up and scheduling of patients for planned interventions across Leeds. The pre-operative service manages around 50 000 patients per annum across five hospital sites. Alwyn developed one of the first Patient Blood Management (PBM) programmes in the UK, and is a member of the NBTC PBM working party.

SESSION 4:

14:30 | Priority for Patient Safety and the NHS

WAYNE ROBSON

Head of Patient Safety – Cross System Development, NHS Improvement

Wayne is a former nurse consultant in critical care and for the past 10 years has worked in and around patient safety working as a patient safety lead in acute Trusts and some time in education as a nurse lecturer. He now works for the national patient safety team at NHSI. He has particular interests in human factors and involving patients in patient safety.

14:40 | Expert panel discussion – Influencing and changing practice

INCLUDING REPRESENTATIVES FROM

NHS England, RCPath, NHSBT, NHS Improvement and NHS Commissioning

15:30 | Concluding remarks and next steps

DR JONATHAN WALLIS

Consultant Haematologist, Chair, National Blood Transfusion Committee

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