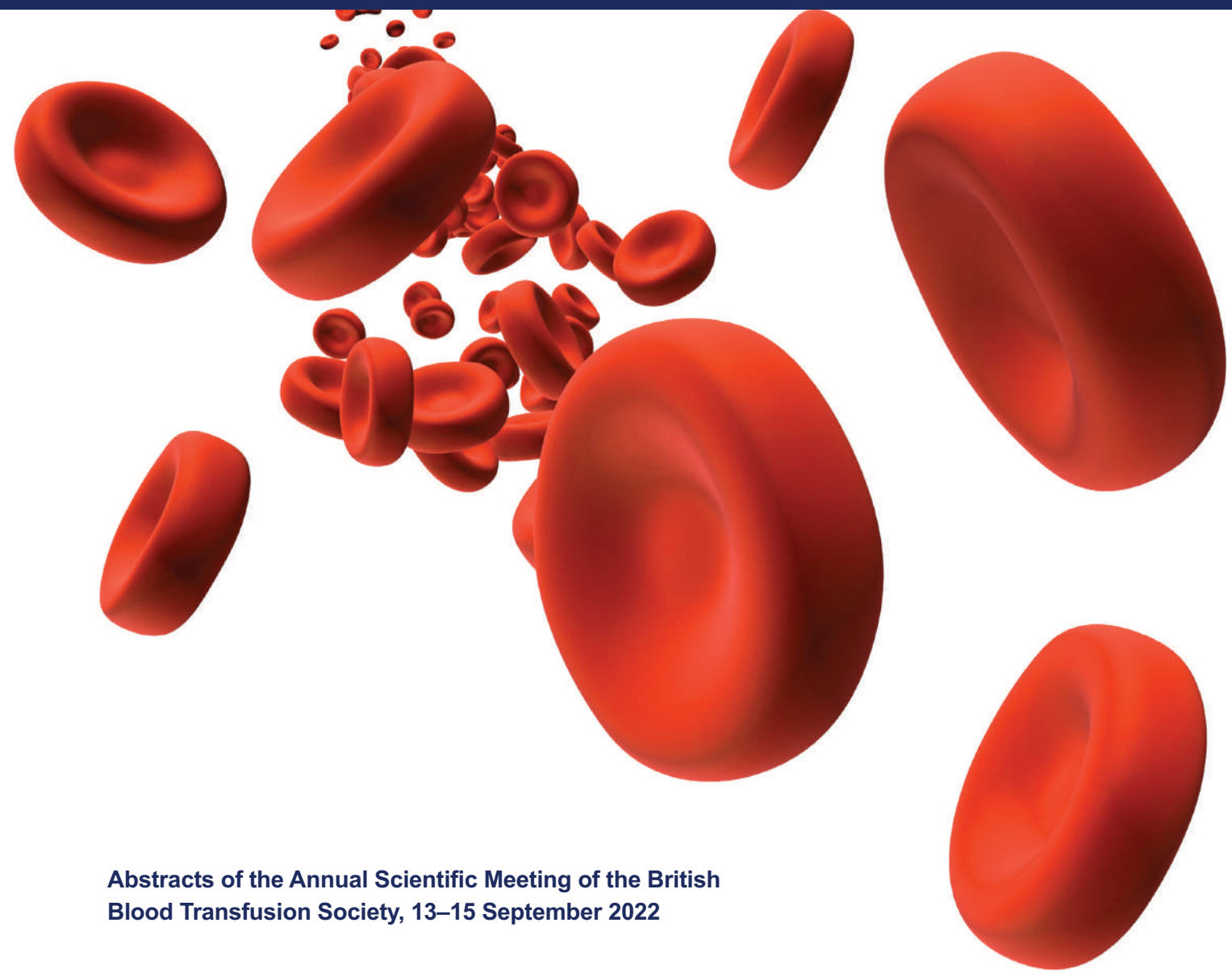
Volume 32 Supplement 2 • September 2022

TRANSFUSION MEDICINE

Official Journal of the British Blood Transfusion Society and the Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis



Abstracts of the Annual Scientific Meeting of the British Blood Transfusion Society, 13–15 September 2022

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British Blood Transfusion Society

nata Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis

Transfusion Medicine

Volume 32, Supplement 2, September 2022

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Abstracts of the Annual Scientific Meeting of the British Blood Transfusion Society, 13–15 September 2022
SEC Centre, Glasgow, UK

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DOI: 10.1111/tme.12906

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ABSTRACT

TUESDAY 13 SEPTEMBER 2022 SIG SESSION

SIG 1: RED CELL 1—MALARIA | Characterisation of a host red cell receptor for *Plasmodium falciparum* rosette formation

Molly S. A. Carlier [1], Lesley Bruce[2], J. Alex Rowe[1]
[1]*Institute of Immunology and Infection Research, University of Edinburgh, Edinburgh,* [2]*Bristol Institute for Transfusion Sciences, NHS Blood and Transplant, Bristol*

Plasmodium falciparum rosetting, the binding of two or more uninfected erythrocytes to an infected erythrocyte, is a key virulence factor associated with severe malaria. Rosette formation is mediated by *P. falciparum* erythrocyte membrane protein 1 (PfEMP1) expressed on the surface of infected erythrocytes. Several molecules have been proposed as host rosetting receptors (such as Blood Group A antigen and Complement Receptor 1), but none of these can account for rosetting interactions across all parasite strains, suggesting that major host receptors remain unidentified. The Wrightb blood group antigen, which is formed by a physical interaction between Band 3 and Glycophorin A, has been identified by the Rowe lab as a potential novel rosetting receptor. Antibody fragments targeting Wrightb, disrupt rosettes in several P. falciparum strains, but the mechanism of action of this antibody is largely unknown. This study aimed to characterise this key receptor-ligand interaction implicated in rosetting and determine if a rosette-disrupting antibody to Wrightb is active against a range of P. falciparum strains, suggesting therapeutic potential. To determine whether the Wrightb antigen or Band 3 is a rosetting receptor, we tested the ability of Band 3-transfected K562 cells and naturally occurring Glycophorin null cells to form rosettes with purified P. falciparum-infected erythrocytes. Our results showed that Band 3-transfected cells (expressing the Wrightb antigen) form rosettes with two parasite strains, whereas wild type K562 cells (expressing Glycophorin A alone) do not. Rosette frequency and rosette size did not vary across the glycophorin genotypes examined, showing that Glycophorin A is not essential for rosetting for the parasite strains tested. Further, we revealed that anti-Wrightb antibody fragments show variable activity against a panel of rosetting culture-adapted P. falciparum strains and clinical isolates. Thus, our data suggest that Wrightb could be a potential anti-rosetting therapeutic target, but that, due to the complexity of rosetting mechanisms, multiple host receptors may need to be targeted to obtain an intervention effective against all P. falciparum strains.

SIG 1: RED CELL 1—MALARIA | Investigating the mechanisms underpinning preferential invasion of reticulocytes by malaria parasites

Viola Introini[1]
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Most *Plasmodium* species preferentially or exclusively infect reticulocytes, the precursors of erythrocytes whose continuum maturation can be graded by levels of transferrin receptor (CD71) expression. Because of its capacity of invading cells of all ages, evidence on whether *P. falciparum* also shares this preference for young red blood cells is limited. Using flow cytometry preference invasion assay and video microscopy, we established that multiple strains of *P. falciparum* prefer reticulocytes and support more multiple invasions. The kinetics of reticulocyte invasion appears faster and merozoites trigger weaker membrane deformations prior penetration. We proposed that this inclination towards reticulocytes could be related to specific interactions between the parasite and the reticulocyte or due to more favourable biophysical characteristics. We first dissected the ligand-receptor interactions by generating knockout lines for the majority of the ligands known to take part in invasion. We found that EBA181 and Rh4 specifically bind to reticulocytes whereas CD71, which is important for *P. vivax* attachment, is not involved in *P. falciparum* invasion. Another difference between the modus operandi of these two species is that *P. vivax* triggers maturation of reticulocytes upon invasion promoting the loss of CD71, but this was not seen in *P. falciparum*. Reticulocytes have a lower bending rigidity but tend to have a slightly higher membrane tension, resulting in a higher energy necessary for the merozoite to wrap around the reticulocyte during the invasion. These data highlight the role of specific ligands and receptors and biophysical properties in the understanding of *P. falciparum* predisposition for reticulocytes.

SIG 2: PAEDIATRICS | What did the 2018 national comparative audit of the use of FFP and cryoprecipitate in children and neonates tell us?

Helen New
NHSBT

The recently reported National Comparative Audit of Blood Transfusion (NCA) on the use of fresh frozen plasma (FFP), cryoprecipitate

and transfusions for bleeding in neonates and older children[1] highlighted multiple areas where use of FFP and cryoprecipitate was not aligned with recommendations in national guidelines including BSH.[2] These included organisational issues as well as transfusion care for individual infants and older children, and transfusions for both prophylaxis and bleeding.

A key example was use of prophylactic FFP in non-bleeding patients, of questionable value. The FFP NCA, 2009, demonstrated that FFP transfusions to children were frequently for coagulation abnormalities alone.[3] In that audit, 66% of infants < 1 year old transfused for non-bleeding indications were transfused for 'abnormal coagulation' in the absence of invasive procedure or surgery.[4] Despite guidelines, the 2018 audit found ongoing significant use of prophylactic FFP for 'abnormal coagulation in the absence of procedure/surgery, for 53% of all cases. Neonates were a significant recipient group, with 52% of all paediatric prophylactic FFP transfusions for given on neonatal units. 76.5% of the neonates transfused with prophylactic FFP received it for 'abnormal coagulation', yet 23.2% of the neonates stated to have 'abnormal coagulation' who had a coagulation test reported within the 24 h prior to transfusion had an internationalised ratio (INR)/prothrombin time ratio (PTR) of < 1.5, that is, not significantly abnormal.

These findings and others highlighted areas for the renewed focus of local quality improvement initiatives and education within hospitals. A suggested local action plan to address the main findings was provided within the report to help provide practical impetus for change.

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SIG 5: HOT SIG—TRANSFUSING WISELY | Iron deficiency anaemia audit (Scotland)

John Faulds[1]
[1]*SNBTS Transfusion Team*

Background: Many audits have looked at the diagnosis, investigation and management of iron deficiency anaemia. SNBTS has a database of all patients who are transfused in Scotland, the SNBTS Transfusion Team decided to look at the patients with a coded diagnosis of iron deficiency anaemia to determine if blood was used appropriately in these patients

Aim: The aim of this retrospective audit was to assess the frequency and nature of transfusion in the context of iron deficiency in Scotland and compare with recommendations in available clinical practice guidelines.

Audit Questions: Of those patients in 2017/2018 who had a diagnosis of IDA and received a transfusion (during the episode of care in which a diagnosis of IDA was reported),

1. Was the diagnosis of IDA confirmed?
2. Was the cause of IDA identified?
3. Were the risks, benefits and alternatives to transfusion discussed with the patient?
4. Why was red cell transfusion chosen as a treatment?
5. Was transfusion the only treatment?

Brief Summary: The investigation of iron deficiency is complex and there may be variation in the availability of these tests across different sites as well as the skill set of those interpreting results. The initial application of an algorithm designed to confirm IDA found 52% of audited cases were absolute or functional IDA.

The finding that 27.1% of patients with IDA received 5.1% of red cells transfused in Scotland during 2017/2018 highlights that an audit to determine the characteristics of these patients and the justification for transfusion was warranted. The transfusion rate identified in the IDA patients of 27.1% was high although there were hospitals where transfusion rates in IDA were low, suggesting effective policies may be in place to avoid transfusion to patients with iron deficiency.

In this audit where there was an alternative to transfusion it would be expected that a high proportion would have documentation of a discussion, however, nearly 57.5% ($n = 188$) had no documented discussion. Similarly, 54.3% did not have valid consent documented with 5.9% unable to give consent.

Outcomes: The authors suggested nine key recommendations which relate to improving decision-making around IDA and transfusion and are aligned to the existing Scottish and UK guidance as well as to Realistic Medicine principles and indicate what national bodies and SNBTS Transfusion Team are doing on this subject.

SIG 5: HOT SIG—TRANSFUSING WISELY | Emergency O negative stockholding in Scotland

C. Ferguson[1], K. Forrester[1], M. Rowley[1] & J. Faulds[1]
[1]*SNBTS, SNBTS Transfusion Team (SNBTS TT), Scotland*

Introduction: A proportion of Scotland's O negative blood supply is used to provide lifesaving support in bleeding emergencies, these being unpredictable in terms of patient demographic and blood transfused. Demand for O negative blood continues to be greater than supply, at a current rate which is unsustainable. To guide recommendations to improve O negative red cell supply, the SNBTS TT needed

to better understand the national picture of O negative red cell stockholding.

Method: In July 2021, a questionnaire was developed to gather data on emergency O negative blood stockholding, covering: target stockholding; specification; emergency blood fridge type, location and stockholding; repatriation/stock rotation; supply; major haemorrhage protocol (MHP) activations and challenges/improvements in O negative red cell stock management. Questionnaires were completed by Transfusion Practitioners in collaboration with local Hospital Transfusion Teams.

Results: Forty-one questionnaires were returned, providing information on 23 blood banks and 85 blood fridges; 35% of emergency O negative blood held had specifications in addition to Orr K-; 7–14 days was the most common response for emergency O negative stock repatriation/rotation. The greatest variation was within hospitals transfusing <1500 units annually and these sites held emergency O negative stock disproportionate to their MHP activations. 11.1% of blood banks did not specify the conditions for a move to group-specific blood in their MHP; 51.2% stated the use of O-positive blood in their MHP and this practice was more common in hospitals with greater MHP activations.

Conclusions: The results were analysed and discussed within the SNBTS TT. The following recommendations were published and the report shared within Hospital Transfusion Committees for local implementation.

- Orr K- is a sufficient specification for emergency O-negative blood.
- Aim to move to homologous blood following transfusion of two units of emergency blood.
- Use of emergency O-positive blood where appropriate.
- Good stock management is essential; timely stock rotation; include unallocated unit in stockholding and sharing good practice.

A Remote and Rural Taskforce will be convened to consider the challenges of providing sufficient emergency blood in this group of hospitals whilst minimising wastage.

SIG 5: HOT SIG—TRANSFUSING WISELY | Ten steps to saving >£200K in a Major Trauma Centre

Fateha Chowdhury[1]

[1]*Imperial College Healthcare*

Introduction: Blood is a precious resource which is gifted by voluntary donors. In the last 12 months we have experienced blood shortage to an extent never experienced in the past. St Mary's Hospital is a Major Trauma Centre which hosts many higher users of blood components. Over the last 5 years we have steadily improved on wastage costs by improving our stock management, and reducing clinical wastage.

Methods:

1. Review of monthly highlight reports.
2. Review of monthly BSMS reports.
3. Advice from BSMS analysts—use of VANESA to help streamline stock holding/ordering.
4. Implementation of the 60-min rule to reduce wastage of units due to time out of the fridge across all sites.
5. Review of BMT protocols to implement inclusion of ALL compatible ABO Rh D groups.
6. Seasonal review of stock—Holidays, for example, BH, Easter, Christmas and Summer.
7. Sharing of short-dated stock between sites.
8. Rotation of platelets across sites.
9. Regular attendance at Anaesthetic/Trauma Clinical Governance meetings to highlight OTCOL wastage.
10. Promoting clinical ownership of wastage.

Results: There has been yearly reduction since 2017 in RBC and platelet wastage. During 2017, 653 units of RBC were wasted (£80 420), this was reduced to 190 units (>£27K) by 2021 and platelet wastage of 211 units (£38 450) in 2017 to 81 units (£17 696) in 2021. If wastage had not been addressed, over 3265 units of RBC and 1000 units of platelets would have been wasted over 5 years. With the quality improvement measures taken actual wastage over the last 5 years was 1977 RBC units and 691 platelets units. Resulting in saving over 1200 units of RBC and over 300 units of platelets, with total combined cost savings of £227 738.

Conclusion: Over 1200 units of RBC (£153 300) and 300 units of platelet (£74 438) have been saved over 5-year period. It is expected additional savings can be made with further improvements in stock holding and addressing clinical wastage with promotion of better practice.

SIG 6: COMPONENTS SIG—DEHP FREE BLOOD BAGS, THE CHALLENGES AHEAD | DEHP background: What's all the fuss?

Ryan Evans[1]

[1]*SNBTS Transfusion Team*

The sunset date of 27 May 2025 has been set for the phasing out of di (2-ethylhexyl) phthalate (DEHP) in the European Union. This plasticiser has been used in blood bags since the 1950s and there are currently no commercially available alternatives on the market for whole blood collection.

Despite a long history of safe use in blood bags, concerns around the safety of DEHP have been raised on the basis that it has endocrine-disrupting effects and poses a risk to the environment. This negates the previous exemption for use in specific medical devices including blood bags.

DEHP itself is known to have a positive effect on the stability of the red blood cell membrane, allowing 35-day shelf-life of red cell concentrates. Any alternative plasticisers, potentially coupled with new additive solutions, will need to be validated to demonstrate comparable component quality.

Other factors are also relevant: BREXIT, the new MDR and potential up classification of some bags to Class III, and any new or existing system will also require UKCA marking. The combination of these factors poses a significant risk to the blood supply. Collaborative working between manufacturers, blood establishments and competent authorities is essential.

SIG 6: COMPONENTS SIG—DEHP FREE BLOOD BAGS, THE CHALLENGES AHEAD | **Blood Centres readiness regarding removal of DEHP from blood bag systems**

Dirk de Korte[1]
[1]*Sanquin Blood Service*

Background and Objectives: Di(2-ethylhexyl) phthalate (DEHP) must be removed from blood bag sets in Europe by 27 May 2025. DEHP is known to interact with the red blood cell (RBC) membrane, resulting in reduced haemolysis and thus prolonging shelf-life. Current non-DEHP alternatives result in increased haemolysis requiring reconsideration of the RBC shelf-life. Although the immediate impact of eliminating DEHP is to the European community, the non-DEHP movement could affect blood bag set availability globally. The purpose of this survey is to understand blood centre readiness regarding the transition to non-DEHP blood collection and storage systems.

Materials and Methods: A 24-question on-line survey was completed by members of the Biomedical Excellence for Safer Transfusion Collaborative research network.

Results: Responses were obtained from 16 blood collection or processing institutions. A majority of respondents (12/16) indicated that both shelf-life and haemolysis were equally important in selecting non-DEHP blood bag sets. Six respondents would accept a lower RBC product shelf-life compared to current practice. Respondents were not clear on the best non-DEHP vinylmaterial or RBC storage solution. Three European blood centres indicated they have developed non-DEHP transition plans. One challenge identified regarding the transition to non-DEHP is the extensive validation testing that will be required.

Conclusion: Blood centres in Europe are concerned with meeting the sunset date for DEHP, considering that limited non-DEHP blood bag and RBC storage solutions are currently available. Banning DEHP in Europe, which may have global ramifications, represents a major challenge not yet fully understood by the transfusion medicine community.

SIG 6: COMPONENTS SIG—DEHP FREE BLOOD BAGS, THE CHALLENGES AHEAD | **Harmonizing requirements for non-DEHP component validation**

T.R.L Klei[1], D. de Korte[1], S. Begue[2], T. Najdovski[3], A. Lotens[3], W. Handke[4], R. Evans[5], C. George[6], J. Eronen[7], P. van den Burg[1], S. Thomas[8], L. Larsson[9]. O. Sigurjónsson[10], M. Wilthshire[8], B. Mallas[7]
[1]*Sanquin, The Netherlands*, [2]*Etablissement Français du sang (EFS), France*, [3]*SFS Croix Rouge Belge, Belgium*, [4]*BRK Blutspendedienst, Nürnberg, Germany*, [5]*SNBTS, Scotland*, [6]*Welsh Blood Service, Wales*, [7]*Finnish Red Cross Blood Service, Finland*, [8]*NHSBT, England*, [9]*Karolinska University Hospital Stockholm, Sweden*, [10]*Blood-Bank, Landspitali University Hospital, Iceland*

DEHP has been used in blood bags since 1955 to make PVC blood bag systems flexible to allow processing of the drawn donor blood in a closed system into various blood components for treatment of patients. Concerns about the health effects of plasticizers that could lead to endocrine disruptive consequences have resulted in European legislation aiming to diminish or ban the use of phthalate plasticizers. In short, the EU faces a sunset date for the commercialization of DEHP-containing products as of 27 May 2025.

There are major concerns in meeting the sunset date as:

- There are currently no commercially available validated transfusion non-DEHP devices for red blood cell collection and storage with a comparable quality to DEHP-containing devices.
- An orderly (validation of whole chain) transition to non-DEHP blood bag systems is needed to guarantee the sufficiency and safety of blood transfusion and transplantation.
- Time is needed for proper assessment of alternatives and validation of the blood supply chain, from the donor to the final recipient.

As such some of the European manufacturer's plan to apply for authorization for the continued use of DEHP beyond the sunset date. European Blood Alliance (EBA) members aim to establish common grounds on the evaluation and assessment of blood components collected, prepared and stored in non-DEHP devices. Studies in the scope of evaluating the quality of labile blood products obtained with non-DEHP devices, under the condition that they are carried out according to these recommendations, could be used by all members of the EBA to serve as scientific support in the authorization process specific to their jurisdiction or for their internal validation use.

SIG 7: RED CELL SIG 3—ERYTHROID DEVELOPMENT AND CELL LINES | **The long and the short of GATA1 functions in erythropoiesis**

John Strouboulis[1,2]
[1]*King's College London, School of Cancer & Pharmaceutical Sciences, Faculty of Life Sciences & Medicine, UK*, [2]*Red Cell Haematology, Comprehensive Cancer Centre, School of Cancer and Pharmaceutical Sciences, King's College London*

GATA1 is the master transcription factor of erythropoiesis regulating all aspects of erythroid maturation and red cell functions. The GATA1 protein has three functional domains: a *N*-terminal 'activation' domain (N-TAD) and two homologous zinc finger (ZnF) domains in the C-terminal half of the protein. Translation of the GATA1 mRNA in human erythroid cells produces two isoforms: the full-length protein and a shorter variant (GATA1s) translated from codon 84 within the third exon, which lacks the N-TAD. Mutations resulting in exclusive GATA1s expression are implicated in Diamond-Blackfan Anemia (DBA) and, together with Trisomy 21, in myeloid leukaemia of Down syndrome (ML-DS) in children. Previous studies using cellular models from ML-DS and DBA patients carrying GATA1s mutations showed that the

loss of the N-TD in GATA1s resulted in severely impaired erythropoiesis and concomitant expanded megakaryopoiesis. It is unclear why the loss of the GATA1 N-TAD results in defects in hemato/erythropoiesis. I will present on-going work in our lab investigating the molecular basis of GATA1s dysfunction in erythropoiesis using human erythroid cellular models and transgenic mouse models.

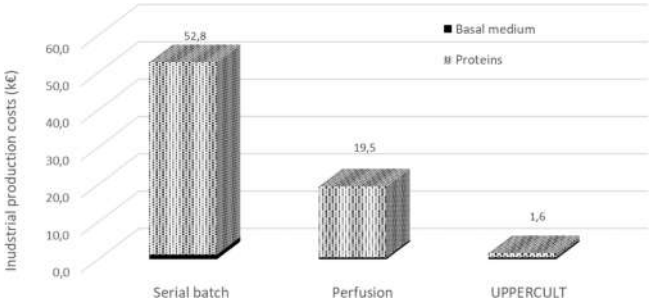
SIG 7: RED CELL SIG 3—ERYTHROID DEVELOPMENT AND CELL LINES | A new step on the road to red blood cell factory

Guillaume Rosseau[1]
[1]*ERYPHARM, Faculté de médecine St-Antoine, Paris, France*

In recent decades, the pharmaceutical industry has made immense progress in the field of cell culture-based therapies with new treatments—approved and in the exploratory phase—using increasingly innovative approaches. However, current leading-edge technologies do not allow for affordable production of large-scale cell therapies that require vast numbers of cells, such as certain regenerative cell therapies, allogeneic CAR-T cell approaches and cultured red blood cells (cRBC). The development of cRBC undoubtedly represents the greatest industrial challenge facing these applications due to the very large volume of clinical doses (>10^{12} cells), which is ~10 000-fold higher than for existing CAR-T cell products by way of comparison. Hence, scientific and technological barriers must be overcome in terms of yield and production costs to transform these visions into tangible reality.

Strikingly, the potential clinical value of stem cell-derived cRBC in blood transfusion has already been established on a small scale, offering exciting prospects for transfusion-dependent patients. However, production costs using standard cell culture processes amount to tens of thousands of euros per cRBC unit, which is simply not viable. Industrial scale-up and economic sustainability would require a drastically intensified process and considerably lower production costs. Cell culture media represent the bulk of manufacturing costs, with proteins (albumin, growth factors etc.) being the main cost drivers. Reducing, replacing or recycling proteins is therefore essential.

We embraced these challenges to develop UPPERCULT, a new scalable technology inspired by perfusion, achieving more than 20-fold cell concentration (100 × 10^6 cells/ml) versus conventional batch, with over 75%, or gold-standard, cell enucleation. As this process simultaneously preserves 95% of proteins, a cRBC unit could be produced for the first time for less than EUR 2000 (> 25-fold reduction vs. serial batch; see figure).Successfully developed on a scale of 2 L, UPPERCULT already yields 1/10th of a cRBC unit per batch, and can be scaled up to several dozen cRBC units per batch, at the very least. Our technology thus offers a ground-breaking solution for the industrial production of cRBC, together with other similar large-scale cell therapies, and could lead to a new era in transfusion.



SIG 7: RED CELL SIG 3—ERYTHROID DEVELOPMENT AND CELL LINES | Characterisation of a host receptor for *Plasmodium falciparum*-infected erythrocyte rosette formation

Debbie Daniels[1], Molly S. A. Carlier[2], Lesley Bruce[3], J. Alex Rowe[1]
[1]*School of Biochemistry, Faculty of Life Sciences, University of Bristol, UK,* [2]*Institute of Immunology and Infection Research, University of Edinburgh, Edinburgh,* [3]*Bristol Institute for Transfusion Sciences, NHS Blood and Transplant, Bristol*

Plasmodium falciparum rosetting, the binding of two or more uninfected erythrocytes to an infected erythrocyte, is a key virulence factor associated with severe malaria. Rosette formation is mediated by *P. falciparum* erythrocyte membrane protein 1 (PfEMP1) expressed on the surface of infected erythrocytes. Several molecules have been proposed as host rosetting receptors (such as Blood Group A antigen and Complement Receptor 1), but none of these can account for rosetting interactions across all parasite strains, suggesting that major host receptors remain unidentified. The Wrightb blood group antigen, which is formed by a physical interaction between Band 3 and Glycophorin A, has been identified by the Rowe lab as a potential novel rosetting receptor. Antibody fragments targeting Wrightb, disrupt rosettes in several *P. falciparum* strains, but the mechanism of action of this antibody is largely unknown. This study aimed to characterise this key receptor-ligand interaction implicated in rosetting and determine if a rosette-disrupting antibody to Wrightb is active against a range of P. falciparum strains, suggesting therapeutic potential. To determine whether the Wrightb antigen or Band 3 is a rosetting receptor, we tested the ability of Band 3-transfected K562 cells and naturally occurring Glycophorin null cells to form rosettes with purified *P. falciparum*-infected erythrocytes. Our results showed that Band 3-transfected cells (expressing the Wrightb antigen) form rosettes with two parasite strains, whereas wild type K562 cells (expressing Glycophorin A alone) do not. Rosette frequency and rosette size did not vary across the glycophorin genotypes examined, showing that Glycophorin A is not essential for rosetting for the parasite strains tested. Further, we revealed that anti-Wrightb antibody fragments show variable activity against a panel of rosetting culture-adapted *P. falciparum* strains and clinical isolates. Thus, our data suggest that Wrightb could be a potential anti-rosetting therapeutic target, but that, due to the complexity of rosetting mechanisms, multiple host receptors may need to be targeted to obtain an intervention effective against all *P. falciparum* strains.

SIG 8: BLOOD BANK TECHNOLOGY | DEHP background: What's all the fuss?

Ben Holmes[1]
[1]United Lincolnshire Hospitals

The sunset date of 27 May 2025 has been set for the phasing out of di (2-ethylhexyl) phthalate (DEHP) in the European Union. This plasticiser has been used in blood bags since the 1950s and there are currently no commercially available alternatives on the market for whole blood collection.

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SIG 9: MICROBIOLOGY | A FAIR policy for blood donation in the UK

K. Davison[1], C. Reynolds[2], E. Ferguson[3], S. Brailsford[2]
[1]UK Health Security Agency, London, UK, [2]NHS Blood and Transplant, London, UK, [3]University of Nottingham, Nottingham, UK

The work towards the FAIR policy for blood donation began in 2019, when the steering group set out a work plan to gather evidence for a more individualised approach to donor selection. The steering group included representation from the four UK blood services, the UK Health Security Agency, University of Nottingham, charities, and campaign groups representing people affected by this policy change including lesbian, gay, bisexual, transgender plus LGBT+ groups, people affected by HIV, donors and recipients of blood components.

The evidence identified reliable and acceptable questions to ask donors to identify higher-risk sexual activities and allow those at low risk to donate. This was considered a more equitable approach than asking everyone with sexual partners from increased risk groups including men who have sex with men (MSM) not to donate for 3-months, which was the policy at the time. FAIR, recommended all donors would be asked if in the last three months they have had gonorrhoea, used drugs during sex (chemsex) or had anal sex with a new or multiple partners. If their answer was no, and no other donor selection criteria apply, they could donate.

In 2020, the government accepted the recommendation to change to FAIR and the policy was implemented from June 2021, with monitoring in place to assess the impact. The new questions were included on the pre-donation questionnaires from 14 June 2021 in England, Scotland and Wales, and from 14 August for Northern Ireland, and the MSM questions were removed. The HIV endemic area question was removed by the end of 2021 across the UK.

The UK was one of the first countries to implement this type of a gender-neutral approach to risk assessment for blood donation. Here we will present some of the data that informed this policy change, along with post-implementation infection surveillance data that demonstrates there has been no impact on the safety of the blood supply.

DOI: 10.1111/tme.12907

TRANSFUSION MEDICINE WILEY

ABSTRACT

WEDNESDAY 14 SEPTEMBER 2022 SIMULTANEOUS SESSION

SS1: SEROLOGICAL CASE STUDIES | Preventing transfusion delays in a patient with alloantibodies (anti-Jsb and Jkb)

Tracey Hui[1,2]

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In January 2022, SHOT issued a CAS alert addressing prevention of transfusion delays in bleeding and critically anaemic patients. Morbidity and mortality related to delayed transfusion remains an issue with increasing numbers reported to SHOT annually. The presence of red cell antibodies is recognised as a potential cause for transfusion delays.

This case demonstrates how close collaborative working by a multidisciplinary team and early demand planning can prevent transfusion delays in a patient with complex transfusion requirements and multiple alloantibodies.

A 25-year-old female with severe sickle cell disease presented to the hospital with a painful crisis. She had previous episodes of acute chest crisis (ACS) requiring emergency red cell exchange (RCE) and had recently started Crizanlizumab. She was group O Ro K-with allo anti-Jsb and anti-Jkb antibodies. Given the scarcity of Js(a+ b−) and Jk(a+ b−) red cells, previous units were sourced from the national frozen blood bank (NFBB).

Initially, two units were requested from NHSBT RCI (Red cell Immunohaematology) for a top-up transfusion. A national search identified only two compatible wet units. Given her previous history and difficult transfusion requirements, a pre-emptive search for other compatible units, including at NFBB, was also performed alongside detailed discussions between RCI and the clinical team to anticipate her likely ongoing transfusion needs and to agree a 'plan B' in case of urgent transfusion before the units from RCI were available. There were also discussions with the rare donor team to explore calling in suitable donors.

Her rapid deterioration, even prior to the two unit top-up transfusion, necessitated further requests for red cells over the next 48 h: initially another two units for top-up, then a further four units for partial RCE for ACS. Early demand planning (including consensus to drop requirements for age of unit and extended Rh matched) meant that a number of suitable units were identified in advance from NFBB thus minimising delays to provision to the hospital. Close collaboration between the clinical team, RCI, NFBB and rare donor team continues in order to facilitate monthly elective top-up transfusions, as well as, stock-building within NFBB in case of future RCE.

SS1: SEROLOGICAL CASE STUDIES | Homozygosity for a novel *FUT1* allele associated with weak H-transferase activity and an H-negative phenotype

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Introduction: Biosynthesis of H antigen, the precursor for A and B antigens, is catalysed by two fucosyltransferases, encoded by *FUT1* and *FUT2* genes. H-transferase, the product of *FUT1*, synthesises red cell H antigen, whilst *FUT2*-encoded transferase synthesises soluble, secreted H antigen. Rare H-deficient red cell phenotypes arise from homozygosity for variant *FUT1* alleles, expressing inactive or weakly active H-transferase.

Methods: Samples from two female patients (P1 and P2) were investigated, together with the sister (P3) of patient P2. Serological investigations were performed by LISS tube IAT and direct agglutination techniques. ABO genotyping using real-time PCR and Sanger sequencing of *FUT1* and *FUT2* was performed.

Results: P1 cells were found to have Bh phenotype, whilst P2 and P3 cells both had ABh phenotype. All three had anti-H in their plasma, reacting weak to moderate strength by LISS IAT with untreated and papain-treated cells. Two examples of Oh cells were compatible with each patient's plasma. Additionally, one example each of Ah and Bh cells were compatible with P2 and P3 plasma and P2 cells were compatible with plasma of her sister (P3). P1 cells expressed weak B antigen, whilst P2 and P3 expressed very weak A and marginally stronger B antigen. P2 and P3 plasma contained moderate strength anti-A and weak anti-B in direct agglutination tests at 18°C. All three patients' cells were H−. ABO genotyping for P1 and P2 was concordant with serological phenotypes (P1: BO1, P2: AB). *FUT1* sequencing revealed homozygosity for the same novel allele in all patients; c.784C>T, encoding p.Ser262Cys. *FUT2* sequencing showed homozygosity for an inactive allele, *FUT2*01N.15*, in each case.

Conclusions: We have identified a novel *FUT1* allele, carried in the homozygous state in three patients. We conclude that this allele encodes weakly active H-transferase due to presence of weak A and/or B antigen on patients' cells. The small amount of H produced has been converted to A and/or B, resulting in the observed H– phenotype and anti-H production. Interestingly Ser262, altered as a result of this novel allele, is also affected in *FUT1*01N.11* allele (p.Ser262Lys), reportedly resulting in inactive H-transferase and an H– phenotype.

SS2: BLOOD DONORS AND DONATION | How we're engaging donors and advocates

Andrew Harris[1]
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How hard can it be to get donations?

Each year the Welsh Blood Service is tasked with recruiting thousands of new donors to help collect around 100 000 whole blood donations. To do this, the teams within Donor Engagement have written a new strategy designed to 'Empower people in Wales to continuously donate, advocate and inform Service delivery'.

Our goal is simple, to help us encourage new donors to give blood, and to keep current donors donating with us.

Using local influencers, working in partnership with large, national organisations and modernising how we interact with donors—to inspire commitment from donors and supporters.

The promotional focus is pinpointed to areas where it is needed, making the best use of the resources available, leaning on support from willing influencers from local football clubs and commonwealth athletes to politicians and community volunteers to boost awareness.

Ten principles were created based on donor insight and staff expertise with three areas outlined for the improvement: systems, processes and staff investment.

Long journey of improving our systems.

Innovative thinking to overcome system shortcomings with improved processes, automating where possible.

Investing in staff. Task and finish groups for continuous improvement.

Remove complexity within BAU to increase creativity. Make data accessible to support staff.

We may not know what the future holds but putting the focus on donors and supporters, and systematically improving our systems, processes and staff investment, we'll be ready.

SS2: BLOOD DONORS AND DONATION

Jayne Hughes[1]
[1]*Consultant Clinical Scientist & Stem Cell Lab Director*

Nerve injury after donation is infrequent and usually resolves over a few weeks to months. However, for a small percentage of affected donors, symptoms can persist and develop, leading to long-term morbidity and disability. Under current guidance, the presence of neurological symptoms lasting more than one year is classed as a serious adverse event of donation (SAED), regardless of the severity of the symptoms. Haemovigilance data from the Serious Hazards of Transfusion (SHOT) report indicates that venepuncture-related SAEDS contribute most to SAED rates amongst the UK transfusion services (25 out of 51 SAEDs in 2021).[1]

Management of donors with ongoing neurological symptoms post-donation is challenging for transfusion services. In 2017, the Standing Advisory Committee for the Care and Selection of Donors set up a short life working group whose remit was to develop 'best practice guidelines' to support donor-facing staff in the assessment and management of donors. These guidelines were approved and published on the JPAC website in 2020.[2]

This presentation will give an overview of venepuncture-related nerve injury at session and afterwards, with a focus on the recommendations laid out in the JPAC guidance for management of affected donors in the post-donation period. Topics covered will include good venepuncture technique; management of nerve pain at session; assessment and management of donors in the post-donation period; and recording of surveillance data for nerve injury adverse events.

Finally, the impact of new validated adverse event severity grading criteria, as developed by the Association for the Advancement of Blood and Biotherapies (AABB) and endorsed by the International Haemovigilance Network (IHN) will be discussed.[3] These criteria, which are being implemented by the UK Transfusion Services, reduce the time period for an SAED from one year to six months.

[1]Annual SHOT report, 2021. Chapter Donor Haemovigilance. Available at: SHOT Annual Reports and Summaries (shotuk.org)

[2]Post-donation management of Blood Donors with nerve injury related to donation November 2020. Available at: General Documents (transfusionguidelines.org)

[3]Severity grading tool for donor adverse events developed by AABB Donor Hemovigilance Working Group and endorsed by ISBT, IHN and EBA. Available at: https://www.ihn-org.com/wp-content/uploads/2020/06/Tool_brochure_all_logos.pdf

SS3: QUALITY IMPROVEMENT/SHOT | Vein-to-vein (V2V) traceability—An all-wales collaboration

Rebecca Carnegie[1]
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Introduction Blood Transfusion is a highly regulated process involving a multi-disciplinary team. It is very reliant on human factors, resulting in repeated reporting of blood sampling errors. In Wales, 228 SHOT[1] reportable incidents were recorded in 2019–2020, 170 of which could have been avoided with the introduction of an electronic blood tracking solution. In 2017[2] and 2020[3], a SHOT key recommendation stated that use of electronic blood management systems is 'no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for'. None of the Health Boards (HBs) in Wales has

the whole V2V system. Method A proposal paper was submitted to Welsh Government (WG) to request funding for a scoping exercise to build a business case for V2V traceability for every HB in Wales. The Digital Project Investment Fund (DPIF) requested the scoping look at ward devices already available, links to other successful projects and the National Safety and Digital Agendas in Wales. To date, we have; scoped out ward-based devices, visited sites with the system in place, sent out a user survey to the HBs to gather requirements and procured Blood Track Courier kiosks for those requiring them. We have also received recommendation that V2V be implemented in all Welsh HBs from Health Technology Wales (HTW)[4]. Results In 2020 red cell wastage across Wales was 8.63%. Platelet wastage was 16.4%. Centres using the BloodTrack system have demonstrated that it facilitates a wastage rate of just 1%. This could equate to the saving of over 5500 units of blood (~£820 000) and over 1200 units of platelets (~£282 000) each year from being wasted. Data show the electronic system could reduce patient re-bleeds from 12.2% to 0.3% (~£7000 to £11 000 of staff time), reduce litigation cases related to transfusion errors and the cost of failing to meet SABRE/MHRA requirements, leading to transfusion laboratories, and ultimately hospital closure. Conclusion The procurement and implementation of V2V traceability nationally would advance Wales against many Trusts in the UK, this will enable Wales to be the safest nation in the world for transfusion.

SS4: MARGARET KENWRIGHT AWARD ORALS

MK01 | Can variant red blood cells tell us something about reticulocyte maturation?

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Introduction: To adequately supply tissues with oxygen, the bone marrow needs to produce two million reticulocytes per second. These newly formed reticulocytes have a mean cell volume (MCV) of 120–140 fl. They must remove or degrade redundant organelles and proteins, and reduce 20% of their surface area and 15% of their volume to achieve the size and shape of a mature red blood cell (RBC) (80–100 fl). Certain RBC conditions, known as the hereditary stomatocysis (HSt) group, result from mutations in key RBC plasma membrane proteins. These RBC defects affect the cation permeability of the RBC membrane and result in variant RBCs with altered size and hydration. We noticed that the MCVs of these variant RBCs are similar to the MCV of maturing reticulocytes, suggesting incomplete reticulocyte maturation.

Method: Ghost membranes were prepared from immature culture-derived reticulocytes (cRBCs), mature donor RBCs and RBCs from patients with Overhydrated Hereditary Stomatocytosis (OHSt), South-East Asian Ovalocytosis (SAO), stomatin-deficient Cryohydrocytosis (sdCHC), Cryohydrocytosis (CHC) and Hereditary Spherocytosis (HS) as a control. The protein profile of reticulocyte markers was compared between the ghost membranes from cRBCs, RBCs and the RBC variants by western blotting.

Results: It was shown that OHSt RBCs, which have the largest MCV (120–140 fl), presented a very similar profile to that of cRBCs. A large amount of redundant proteins and organelles had not been eliminated from OHSt RBC membranes, indicating incomplete reticulocyte maturation. More intermediate sized RBCs (SAO, CHC and sdCHC; MCV 100–120 fl) showed retention of some redundant protein and endoplasmic reticulum (ER) indicating some degree of maturation.

Conclusion: The protein profile, as detected in the ghost membranes from RBC variants, has provided an insight into the mechanism of reticulocyte maturation. The largest RBC variant, OHSt, had a profile similar to an R1 reticulocyte and the intermediate sized RBC variants had profiles similar to R2 reticulocytes. We propose a model for the different stages of reticulocyte maturation, suggesting that the removal of mitochondria and lysosomes may occur first and the removal of ER and redundant proteins occurs at a later stage[1].

MK02 | Alloanti-D in a mother carrying a D variant fetus: Challenges for fetal genotyping

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Introduction: IBGRL (International Blood Group Reference Laboratory) Molecular Diagnostics offers non-invasive fetal genotyping for pregnant women with immune anti-D who are at risk of Haemolytic disease of the Fetus and Newborn (HDFN). Testing is performed using cell-free DNA isolated from maternal blood from 16 weeks gestation. The RhD-negative phenotype is usually caused by homozygosity for complete deletion of the RHD gene, allowing detection of fetal RHD against an RHD-negative maternal background. Testing is complicated by the existence of huge numbers of RhD variants, often caused by RHD-RHCE hybrid genes. Multiple regions of RHD are therefore amplified to aid detection of variants.

Case study: A blood sample from a D-negative pregnant woman with alloanti-D was received for fetal RHD genotyping at 19 weeks gestation. Initial testing was performed by real-time PCR using fetal DNA extracted from maternal plasma. RHD exons 4, 7 and 10 were successfully amplified, RHD exon 5 was not detected, suggesting the presence of a fetal hybrid gene (lacking RHD exon 5). Maternal origin was ruled out by analysis of genomic DNA extracted from maternal buffy coat, confirming the lack of RHD in the mother. Paternal genomic DNA testing revealed the presence of RHD exons 4, 7, 10 and apparent lack of exon 5 as observed in the fetus. Serological testing of paternal blood using an extensive panel of anti-D reagents gave the expected pattern of reactivity for DV variant. The father's cells were also positive for the DV-associated low frequency antigen Dw. Changes in RHD exon 5 result in DV variants, DV type 2 is associated with an RHD(1-4)-RHCE(5)-RHD(6-10) hybrid gene, consistent with results from the father and fetus in this case.

Conclusion: It is likely that the fetus has inherited the father's DV variant allele, resulting in a predicted D variant phenotype. Unfortunately, it was not possible to obtain sample from the baby for serological confirmation. This case highlights the need for awareness of the potential for anti-D production in mothers carrying a D variant fetus. Changes to current practice within IBGRL for both testing and reporting of fetal variants have been introduced as a result.

MK03 | Every minute counts: a comparison of thawing times and haemostatic assessment of Fresh Frozen Plasma at 37 and 45°C using different thawing methods

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Background: Delays in the provision of blood components during major haemorrhage, where time is of the essence, can have detrimental effects on patient outcome. Easy access to fast-thawed plasma would be hugely beneficial in the management of bleeding patients and could also contribute to reducing the wastage of plasma. The times to thaw plasma vary depending on method used, volume of component and number of units thawed. Current national guidance in the UK for thawing plasma recommends that the optimal temperature at which plasma components should be thawed is 37°C.

Methods: The thawing time of FFP were assessed using Barkey Plasmatherm Classic (BPC) at 37 and 45°C, Barkey Plasmatherm V (BPV) at 37 and 45°C, Sarstedt Sahara-III Maxitherm (SSM) at 37°C and Thermogenesis Thermoline (TT) at 37°C. FFP volumes ranged from 200 to 320 ml.

LG-Octaplas was used for the assessment of haemostatic quality and once thawed aliquots were taken for haemostatic testing at three different time points post-thaw: 5 min; 24 and 120 h. Assays performed were prothrombin time (PT); activated partial thromboplastin time (APTT); fibrinogen; factor II, V, VII, VIII and XI activity; free protein S antigen and protein C activity.

Results: The thawing time [standard deviation, (SD)] for four units was statistically significantly shorter with BPV at 45 and 37°C [9.6 min (0.87) and 11.25 min (0.76), respectively] followed by TT at 37°C [12.37 min (2.1), BPC at 45 and 37°C (13.78 min [0.97]) (16.56 min [1.36] respectively) and SSM 37°C (27.18 min [4.4], respectively) ($p < 0.001$)]. There was no statistically significant difference between any of the haemostatic values measured in LG-Octaplas thawed at 37°C compared with being thawed at 45°C.

Summary/conclusions: The BPV is the fastest method of thawing four units of FFP at both 37 and 45°C, achieving a mean thaw time of under 10 min when thawed at 45°C, while SSM was the slowest. We have demonstrated that thawing at 45°C has no affect on the haemostatic quality of the component when compared with thawing at 37°C. Thawing frozen components at 45°C should be considered to reduce any potential delays in blood provision.

MK04 | 20 years of HTLV screening of blood donations in the UK

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Background: Although most HTLV-infected individuals remain asymptomatic, 10% of them will develop symptomatic disease such as myelopathy, adult T-cell leukaemia/lymphoma (ATLL) and a range of inflammatory disorders. In 2002, the UK blood services introduced universal anti-HTLV screening due to the serious nature of this infection, evidence of transmission through transfusion, and concern about high prevalence among donors originating from endemic areas. All positive donors are asked about possible exposures and referred for specialist care. Since 2017, screening has targeted first-time donors and those providing non-leucodepleted products. We update on HTLV among UK blood donors throughout 20 years of screening.

Methods: Data reported to the UK's surveillance scheme were reviewed.

Results: 2002 to 2021 data identified 286 HTLV-infected donors (0.8 per 100 000 donations), predominantly HTLV-I (n=253). From these, 271 were first-time donors whereas 15 had donated previously with five seroconverting within a year of their previous donation. Prevalence in repeat donations fell from 2.7 per 100 000 in 2002 to <0.7 per 100 000 in 2016 before screening ended. Prevalence of HTLV in first-time donations was 6.5 per 100 000 for the cumulative 20-year period. The majority HTLV-infected donors were women (192/286; 67%), the mean age was 43 years. Of 192 HTLV-infected women, 118 were of child-bearing age (18–40 years; 61%). Half were UK-born (146/286; 50%) with 143 (49%) infections associated with endemic countries (including: West Africa, India, Iran) and probably acquired vertically or from a heterosexual partner. Interestingly, five HTLV-1 positive donors were likely infected through religious self-cutting rituals, known as Matam.

Discussion: HTLV screening of blood donations has clear public health benefits, even though low numbers of positives are identified each year. All HTLV-infected donors are referred for specialist care and identifying women at childbearing age can help to prevent vertical transmission of HTLV.

MK05 | Don't delay! Transfusion of antigen positive blood in patient with anti-Lub

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Introduction: Transfusion support for alloimmunised patients for whom blood components are not readily available is hampered by the risk of a haemolytic reaction and poor recovery. Antibodies to high frequency antigens (HFA) can be difficult to investigate and delay patient care. Lu^b is a HFA present in 99.8% of all populations and belongs to the Lutheran Blood Group System. Anti-Lu^b is deemed clinically significant and requires antigen negative blood. At present, there are no known Lu(b−) donors in Northern Ireland.

Case Report: A patient with severe aplastic anaemia needed transfusion support (2–3 units/week) before Hematopoietic stem-cell transplantation. Pre-transfusion testing demonstrated pan reactivity (1–2+ in BioRad LISS IAT and PeG) with weakened reactivity in enzyme. Through extended phenotyping and allo-adsorption of phenotypically matched blood as well as testing against frozen cells, an anti-Lu^b was identified. NIBTS crossmatched units with heterozygous Lu(a+ b+) expression, finding notable weaker reactions and one unit negative by PeG IAT.

Adding to the complexity, the patient had antibodies to HLA Class I epitopes and platelet autoantibodies with GPIIb/IIIa specificity. Thus, requiring HLA-matched platelets which was challenging to identify and recruit 'best-match' donors to meet demand. Intravenous immunoglobulin was given to improve platelet refractory.

Available red cells were imported from NHSBT, however due to clinical deterioration and fallen Hb to 55 g/L, a Lu(a+ b+) unit was transfused. Methylprednisolone was prescribed prior to the unit being transfused.

Results: Post transfusion there was no signs of a haemolytic transfusion reaction and the patients Hb incremented. Other haematological/biochemical laboratory markers did not indicate haemolysis. Subsequent pre-transfusion testing showed consistent reaction strength suggesting the antibody level had not been boosted.

Imported Lu(b−) units arrived and found compatible for further transfusions. Dedicated donors were bled at NHSBT to further sustain this request as well as frozen stock identified.

Discussion: This case highlights the difficulties in managing patients with complex platelet and red cell requirements. In these cases, collaboration between Blood Services is vital. Prompt communication between scientists and clinical staff is paramount with a plan for blood provision in urgent situations. Moreover, in case of clinical deterioration transfusion should not be withheld.

MK06 | Luom, a novel high incidence antigen in the Lutheran blood group system

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Background: The Lutheran blood group system comprises 27 antigens carried on type I membrane glycoproteins with five immunoglobulin-like extracellular domains, encoded by a single gene *BCAM* located on chromosome 19. Alternative splicing of *BCAM* results in two glycoprotein isoforms, 85 kD Lu glycoprotein and 75 kD basal cell adhesion molecule (B-CAM). Both isoforms carry Lutheran antigens, of which there are currently four pairs of antithetical and 19 high incidence antigens.

Methods: An Omani female with a history of recurrent abortions and a full-term neonatal death presented with an unidentified alloantibody to a high incidence antigen in her plasma. Samples from the patient and her parents were investigated. Serological investigations were performed by standard IAT (LISS tube and Bio-Rad gel) technique. Plasma inhibition studies were completed with soluble recombinant Lu (srLu) protein. Genomic DNA was isolated from whole blood and all the *BCAM* exons were amplified by PCR and analysed by direct Sanger sequencing.

Results: Presence of a Lu-related antibody in the patient's plasma was confirmed, reacting moderate strength by LISS IAT with untreated and papain treated cells. No additional antibodies were detected. Four examples of In(Lu) cells were compatible with patient's plasma, whilst cells from her parents were weakly incompatible. The antibody was successfully inhibited with srLu protein, thus confirming the epitope recognised by the antibody resides on the Lutheran glycoprotein. The patient's cells were found to be LU:−1, 2, 3, 5, 6, 8, 12, 13, 17, 21, 23, 28. *BCAM* sequencing revealed a novel homozygous mutation c.674G>A in exon 6 of the gene, encoding p.Arg225Gln. This mutation is rare, listed in gnomAD database as rs765186154 with an allele frequency of 0.00001. Both parents were heterozygous for the mutation. Homology model of the novel Lutheran glycoprotein was subjected to all-atom molecular dynamics calculations to analyse potential conformational changes.

Conclusion: We report serological and genetic evidence for a new antigen of the Lutheran system, which we propose to call LUOM (LU = Lutheran and OM = Oman), where the absence of this high incidence antigen arises from a single amino acid change p.Arg225Gln in the Lu glycoproteins.

SS5: EMERGENCY PLANNING FOR THE UNEXPECTED | Blood Supply contingency planning post the pandemic

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Strategies to maintain safe blood during emergency and disaster Blood services must be prepared to move quickly in response to changes, during which blood sufficiency is most likely to be affected. The word 'disaster' generally refers to any situation that temporarily restricts or eliminates the ability of the service to maintain its blood supply or a situation that creates a sudden demand for blood higher than usual or a massive influx of donors posing difficulties to the blood collection system. Managing the blood system in disasters is one of the main challenges for any blood service

exposed to natural hazards such as earthquakes, floods, biological threats such what happened during COVID pandemic as well as manmade disruptions and terrorism. A national rather than sub-national or local approach should be adopted for coordination of health services to ensure public confidence in blood safety and supply. Blood services should be included in the national outbreak response, through experts linked to the national emergency response team. Coordination during a disaster among local blood services; national blood organizations; and federal and local government is required to determine the medical need for blood, facilitate transportation of blood from one facility to another, communicate a common message to the national blood community and the public about the status of the blood supply in the disaster-affected area. Supply chain strategies are an important part of disaster planning to ensure the availability of critical material, reagents and consumables for a period of time. Strategies should include staff availability and training as another essential part of planning. The blood collection facilities need to communicate with donors registered in their database and public in general during disaster to reflect the need for donations. Best communication tool to be selected by the collection centre. Planning for disaster should involve a coordinated, multidisciplinary approach to define and document different tasks and responsibilities

SS5: EMERGENCY PLANNING FOR THE UNEXPECTED | **Warzone damage control resuscitation**

David N Naumann[1]
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Damage control resuscitation (DCR) is a concept that arose from experience in conflict to address haemorrhagic trauma and is now entrenched in civilian practice. It is characterised by haemostatic resuscitation and early damage control surgery to address the physiological burdens of acidosis, hypothermia and coagulopathy. DCR requires transfusion of blood products either in ratios that approximate whole blood, or whole blood itself. The Joint Trauma System, the US Defense Committee on Trauma and the Armed Services Blood Program have reached consensus that whole blood is the best blood product for resuscitation in this context. Thousands of units of fresh whole blood (FWB) from donor panels such as 'walking blood banks' have been transfused in the recent conflicts in Iraq and Afghanistan with equivalent survival to component blood products. FWB therefore seems an attractive resilience measure for the austere, far forward or warzone setting, where there are multiple resource and logistic constraints. There is some evidence that immediate, expert surgical control of bleeding may reduce the requirement for blood products, with only minimal use of whole blood transfusion, leading to good survival outcomes even when patients have haemoglobin concentrations that would traditionally be considered under-transfused.

SS6: CLINICAL CASE STUDIES | **Major risk of obstetric haemorrhage**

Jennifer Laird[1]
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The presentation and management of a multiparous pregnant patient with multiple clinically significant red cell alloantibodies and high risk for post-partum haemorrhage are described in this clinical case study. The importance of clear and timely communication and careful planning as part of a multi-disciplinary care team are highlighted, along with the challenges of ensuring availability of suitable blood components at the right time and place for optimal patient blood management.

SS6: CLINICAL CASE STUDIES | **Automated Antenatal anti-D titration**

Abubaker Obeidalla[1]
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A 57-year-old male who underwent a small bowel transplant for ultra-short bowel syndrome that developed after small bowel resection. This was secondary to ischaemia resulting from a superior mesenteric artery thrombus that developed after he had a Whipple's pancreaticoduodenectomy for a neuroendocrine tumour.

The donor was group O RhD negative and the patient is group B Rhd positive. The procedure was unremarkable and induction immunosuppression was initiated intraoperatively with alemtuzumab and methylprednisolone and maintained with tacrolimus post-operatively.

The patient's haemoglobin started to drop at day 5 post-operatively and there was no evidence of bleeding. He received two units of red blood cells, however, his haemoglobin continued to drop further, and his laboratory parameters indicated haemolysis. Blood grouping showed strong presence of anti-B in the patient's plasma.

These findings were consistent with passenger lymphocyte syndrome (PLS), which commonly occurs after organ transplantation. The condition requires a low index of suspicion and is usually treated with supportive care including red cell transfusions. Some cases may require immunosuppression, plasmapheresis or red cell exchange if severe.

SS6: CLINICAL CASE STUDIES | **Blood post-op on an island**

Jade Farrell[1]
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The Princess Elizabeth Hospital, Guernsey, provides pathology services to primary care and outpatients across the five Islands making up the Bailiwick of Guernsey, with a population of ~63 000. Although primary care is accessible on all Islands, pathology samples for processing are transported daily to the pathology department in Guernsey

via commercial flights and by boat. Emergency evacuation from the smaller Islands is also provided in extremely urgent cases by the RLNI lifeboat, and patients needing specialist care can be evacuated from Guernsey via specialist air links. Although these procedures generally run smoothly, they can be affected significantly by weather, flight cancellations and availability of transport methods out of hours; this was made increasingly challenging during the pandemic with flights being reduced to once per week.

Being isolated from the UK and without rapid links to specialist laboratories, the transfusion department is mostly self-sufficient with on Island donations of both red cells and platelets, with regular deliveries of special units or top of stock from NHSBT. With no on-Island consultant service, the transfusion department has had to learn from past experiences and guidance from NHS consultants to shape how we deliver critical care safely to patients both during routine hours out of hours when no evacuation plan, transportation of urgent products or specialist laboratories are available. This case study will discuss how, out of hours, a complex crossmatch was performed and blood was provided for a critical ITP patient off Island in Alderney, with a new strongly reactive suspected autoantibody post IVIG infusion.

SS6: CLINICAL CASE STUDIES | A goal without a plan is just a wish—Plan B for transfusion of a patient with rare blood requirement

Matthew Hazell[1]
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There are ~15 000 people in the UK that have sickle cell disorder (SCD). This lifelong condition causes acute and chronic morbidities, such as severe pain, stroke, chest syndrome, anaemia, blindness and organ damage. Prevention includes drug therapies, such as hydroxycarbamide or crizanlizumab, as well as red blood cell (RBC) exchange or top up transfusion. Transfusion risks alloimmunisation to RBC antigens. RBC selection can be difficult if patients become immunised against high frequency or multiple RBC antigens. Targeted call up of donors or rare unit provision from the National Frozen blood Bank that are antigen negative for the patients RBC antibodies be can be required.

Here we describe the case of a patient with SCD who suffered a stroke and required urgent treatment. Exchange transfusion improved their condition (HbS 18.4%; Hb 100g/L). Three weeks later the patient suffered a delayed transfusion reaction (HbS 77%; Hb 51g/L) and the clinical team urgently requested RBC units. Serological investigation identified pan-reactivity (standard and rare cell panel) that was auto and DAT negative. Their extended RBC phenotype was known (Negative for C, E, K, Kp^a S, Fy^a, Fy^b, Jk^b, Le^b Lu^a). An antibody to a high-frequency RBC antigen was suspected but could not be concluded urgently (excluded alloanti—Fy3).

Plan B RBC provision is important when compatible blood will not be available. This must be a balance of protecting the patient from serious harm of transfusion, but also serious harm from their clinical condition. The plan B created here included:

- Review of availability of ABO compatible RBCs with an extended phenotype
- Unit selection based upon frequency and severity of historic transfusion reaction reports: D>c>C>E>e>K(k)>$Jk^{a/b}$>$Fy^{a/b}$>S/s(U)>M>N>High frequency antigens
- Crossmatch of extra units and issue of the least incompatible
- Consideration of risks related to transfusion reaction and destruction of RBCs following exchange (replacement of patient RBCs with donor RBCs) or top-up transfusion (addition to patient RBCs)
- Prophylactic strategies to reduce transfusion reaction—Steroids, Intravenous Immunoglobulin, Eculizumab, Rituximab, Tocilizumab

Plan B resulted with the improvement of the patient's condition through the successful transfusion of two incompatible RBC units without a transfusion reaction.

DOI: 10.1111/tme.12908

TRANSFUSION MEDICINE WILEY

ABSTRACT

Thursday 15th September 2022 Simultaneous sessions

SS7: CLINICAL TRANSFUSION RESEARCH | The latest in research and trials relating to clinical transfusion practice

Helen New
NHSBT

Further findings and implications of the results of the PlaNeT2 trial

The PlaNeT2/MATISSE randomised controlled trial of prophylactic platelet transfusions for preterm neonates showed evidence of harm of prophylactic platelets for this recipient group.[1] Neonates randomised to receive platelet transfusions at the higher platelet threshold of <50 $\times$ 10^9/L had a higher rate of death or major bleed at study day 28 (the primary outcome) than those at the lower threshold of <25 $\times$ 10^9/L. The 2-year neurodevelopmental outcome results have been awaited. The findings of the trial are likely to have a significant influence on neonatal transfusion guidelines and practice.

Given the unexpected finding of the PlaNeT2/MATISSE trial the next important question is regarding the reasons for the worse outcome in the group who received more transfusions.[2,3] Platelets are heterogeneous and non-standardised components at transfusion. Some factors defining this variability include storage age of the platelets following donation and before transfusion, as well as blood group/compatibility. Using the extensive PlaNeT-2 database, work has been undertaken to explore whether the characteristics of the platelet components transfused could have affected the platelet count increment following transfusion, and whether there is evidence that differences in the platelet components between the two trial arms could account for the results from PlaNeT-2.

As the mechanism of harm of prophylactic platelet transfusions to neonates could be via haemodynamic or haemostatic effects, a further prospective randomised study by Curley and colleagues will look at whether transfusing different platelet volumes (and therefore doses) has an impact on clinical outcome.

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SS8: TP SESSION | TP led research—Can it be done?

Sarah Lennox
Cambridge Institute for Medical Research, University of Cambridge, Cambridge, UK

My name is Sarah Lennox, and I am a Transfusion Practitioner at the Royal National Orthopaedic Hospital in North London. I have been a TP for over 10 years and prior to this an ITU nurse. My presentation is about sharing my experience of TP led research and how I navigated the process of approvals, data collection, writing the manuscript and the road to publication.

As TPs we are regularly involved in organising and completing local and national audits and contributing to other's work, but rarely embarking on research led by ourselves. My aim is to inspire others in the TP role, whether they have a nursing or scientific background to consider taking on either a service evaluation or small scale research project.

The area of interest for my study was drawn from my previous ITU experience. I wanted to understand blood sampling practice from a nurse's perspective and how their views and experiences shape this and the impact this may have on patient outcomes.

My paper, Blood Sampling in Adult Critical Care: a mixed methods study was published in the International Journal of Orthopaedic and Trauma Nursing, May 2022 edition.

SS8: TP SESSION | Data analysis for the management of the electronic BloodTrack bedside device

Raluca Candrea
Oxford University hospitals NHS Foundation Trust

Objective of the project: To ensure bedside equipment (barcode scanners and printers) for transfusion in clinical settings is functioning as expected, and in readiness for clinical use.

Although the use electronic transfusion bedside systems form an integral part of clinical transfusion practice, ensuring transfusion safety in an evolving digital world can be challenging for hospitals. This project introduces a comprehensive process for assessing the functionality of the electronic bedside equipment while simultaneously recording regulatory compliance.

Methodology: A baseline of data relating to equipment issues was audited through a systematic review of the records from our

electronic system over 6 months. Calls to our Helpdesk were also monitored over the same period on specific, objective indicators, such as the length of the conversations, the equipment in question and the number of calls from each area.

Based on the results gathered from the initial analysis, a list of 'High-calls areas' was drawn up and a rolling maintenance register was created. Rolling maintenance (RM) is the planned visit to the clinical device to check and assess its connectivity status, its functioning and integrity.

An automated macro query was designed and used to identify the risk rating value of each bedside device. This value was based on a prioritisation system considering the device's latest connectivity with the server and its bespoke rolling maintenance schedule.

Results to date: The Helpdesk was able to focus on devices identified in the risk-rated analysis.

In the last 16 months, some of the tangible benefits, among others, are:

- Traceability: Un-fated blood and blood components have decreased by 63%.
- The number of calls to the Helpdesk from clinical areas have reduced by 49%
- Equipment related incident reports have reduced by 50%

Conclusions: Incident reporting, traceability concerns, reports of broken electronic blood track equipment and interface concerns required a review of the records from our electronic system. An automated macro query was undertaken based on a risk rating centred on these issues which facilitated a proactive approach to designing and implementing a rolling maintenance programme for our electronic bedside equipment.

[Correction added on 30 January 2023, after first online publication: The author's name was corrected and affiliation was added in this version.]

SS8: TP SESSION | Seeking synergy: Ideas for enhancing impact

Jane Oldham

Transfusion Team, Scottish National Blood Transfusion Service

Introduction: Working synergistically allows each party to increase the effect of the other ('combined effort being greater than parts'). Seeking new opportunities for synergy is timely if we want to enhance impact with increasingly limited resources.

Background: Recent experience of designing a new national transfusion education programme for student midwives involved collaboration with midwifery lecturers. In addition to ensuring that our content and approach was appropriate, this also revealed unexpected benefits, for example, the prompt to use empowering language that midwifery leads are keen for midwives in training to become familiar with (changing 'delivery' to 'birth'). This was a simple change for us to incorporate but has augmented the efforts of others.

Focus: This is a small, simple example but prompts the question: what can we achieve with greater synergistic working?

Established examples might include transfusion team and resuscitation team colleagues working collaboratively to promote important learning points about the major haemorrhage protocol.

New ideas might include how we might improve our response to adverse events and learning from excellence by engaging more closely with those working in other safety critical aspects of healthcare.

Conclusion: The intention of the session is primarily to prompt thinking and share good practice, ideas and experiences rather than provide answers!

SS9: HOSPITAL LABORATORY INFORMATION SYSTEMS—WHERE ARE WE HEADING | Standardisation of practice in preparation for a multi-site LIMS change

Mr Graham Scott

Lead Biomedical Scientist (Haematology/Blood transfusion), SHSCT (HSCNI)

Northern Ireland (NI) is in the process of changing from six disparate LIMS a single unified system across all Acute/Trust sites and Northern Ireland Blood Transfusion Service. This change covers all disciplines in pathology but particular focus was given to blood transfusion

This is a major change in how information management is conducted across the region and as part of the scoping process data was gathered from a wide range of areas that had conducted projects where learning could be used to influence decisions on the process of change in NI. The information received strongly suggested that standardisation of processing be addressed prior to any procurement or implementation of new systems. Due to experiences and difficulties from other locations in the implementation of Blood Transfusion systems particular focus Blood transfusion, increased regulatory oversight of blood transfusion and the integration of the transfusion service onto the same system as trusts.

The presentation describes the work that was undertaken to identify areas of variation in practice across the Blood Transfusion laboratories of Northern Ireland. The aim of the project was to deliver a definitive list of codes and descriptors for requests, tests, blood products and blood components in use across the region. Any obstacles to implementation would documented and resolution of those obstacles sought.

The areas of focus for standardisation were:

- Local laboratory code
- Local laboratory description
- Local report description
- Proposed standard description
- Proposed SnomedCT term.
- Standardised Issuable Product List
- Process standardisation

In addition, the presentation, shows how we managed the following aspects of the process,

- The impact on potential downstream usage of the data, for example, clinical systems and existing blood tracking systems.
- Seek to explain need to maintain close working relationships between scientific and clinical staff in each laboratory in order to maintain full 'buy in'.
- Highlight the need to establish a close working relationship with staff from each laboratory during the initial phases of standardisation and thereafter

- Explain the process of implementation of the products of the process to form a standard baseline to change from old to new LIMS.

SS9: HOSPITAL LABORATORY INFORMATION SYSTEMS—WHERE ARE WE HEADING | **Implementing a new LIMS—The good, the bad and the ugly**

Heather Clarke
DKMS Registry, UK

A brief overview of the journey endured to implement a new LIMS across 2 sites. From the initial high level design and on to low level design of the blood transfusion module, the data migration from the legacy LIMS and the validation and verification performed before being able to train all necessary staff across both sites in time for 'Go Live'. All of this performed by a team of three who were still trying to maintain business as usual during the Covid-19 pandemic.

SS9: HOSPITAL LABORATORY INFORMATION SYSTEMS—WHERE ARE WE HEADING | **Mind the gap—The SCRIPT survey of UK Transfusion Information Technology Systems**

Jennifer Davies
Royal Devon and Exeter NHS Foundation Trust

Information technology (IT) systems are now available to support every aspect of the transfusion process. Annual SHOT reports have identified adverse events where IT may have caused or contributed to errors, was used incorrectly or could have prevented errors but was not used. Despite SHOT recommendations that IT should be utilised to its full potential, themes in IT related errors continue. In 2019, the SHOT Collaborative Reviewing and reforming IT Processes in Transfusion (SCRIPT) group was formed to improve UK transfusion (IT) practices. SCRIPT completed an online survey with 102 UK laboratories in 2021 gathering data about transfusion IT in the laboratory and clinical settings.

The user survey identified challenges to implementation of IT systems, a lack of transfusion IT expertise within teams and a clear need for national guidance for IT suppliers. The user survey also identified key themes relating to laboratory information management systems (LIMS) which were followed up with a LIMS supplier survey in 2021. The key themes included;

- Lack of interoperability with other systems
- Deficiencies in functionality, rules and algorithms to support safe practice
- Deficiencies in LIMS control of safe release of anti-D immunoglobulin
- Financial pressures to support upgrades

This presentation covers the results of the user and suppliers survey, highlights the gaps in demand and supply and details the recommendations from SCRIPT to improve practices. SCRIPT next steps include:

- Continue to promote IT to enhance patient safety
- Education/workshops/toolkit
- Influencing the national IT agenda
- Standardisation of IT systems around critical pints—alerts/flags/warnings
- Link to Human Factors—the use of IT systems to provide 'forcing function'

DOI: 10.1111/tme.12909

TRANSFUSION MEDICINE WILEY

ABSTRACT

Plenary session III

PL 01 | The environmental impact of blood transfusion

Stephen Thomas, Michael F. Murphy, Stephen P. Hibbs

There is an increasing focus on the environmental impact of healthcare activity and blood transfusion is an area worthy of focus. NHS Blood and Transplant produced around 15 000 tonnes of carbon dioxide in 2019, most of which will be attributable to blood donation, testing, manufacture, storage, and distribution of blood components. In addition, there will be emissions from laboratory testing in hospitals, the transfusion process itself and clinical waste disposal. Accounting for NHSBT emissions alone, approximately 6.5 kg of carbon dioxide is emitted per blood component issued. Using the 20% rate of inappropriate transfusion, this equates to 460 000 components, which generated around 3000 tonnes of carbon dioxide emissions without any benefit to patients. Reducing inappropriate blood use would be a simple way to reduce risks to patients while also reducing carbon emissions. More complicated areas to address are the use of plastic in blood bags, tubing, test kits and other 'disposable' items.

PL 02 | How NHSBT plans to grow and diversify its donor base to meet clinical demand and reduce health inequalities

David Rose, NHSBT

David Rose, Director of Donor Experience at NHS Blood and Transplant will be sharing how the organisation plans to grow and diversify its donor base to meet clinical demand and reduce health inequalities.

NHS Blood and Transplant provide a blood and transplantation service to the NHS, looking after blood donation services in England and transplant services across the United Kingdom. This includes managing the donation, storage and transplantation of blood, organs, tissues, bone marrow and stem cells and researching new treatments and processes.

We need hundreds of thousands of donors from diverse ethnic backgrounds to meet clinical demand for appropriately matched blood products, organs, tissues and stem cells.

Despite the generosity of our donors, we are not currently able to supply all patients with the donation they need. These include frequently transfused sickle cell patients as well as Black, Asian and Minority Ethnic patients on the transplant waiting list. This results in health inequalities.

To address these inequalities, we need to attract more donors, especially those with the rarest blood and tissue types and those who are under-represented in our existing donor base. In parallel, we also need to build an entirely new donor base to support our plasma for medicine operation.

We will redouble our efforts on public engagement to reach a higher percentage of people, to encourage more to donate and attract the next generation of donors. We need to ensure that the new donors we recruit reflect the diversity of the UK population by improving the inclusivity of our donation experience and removing the barriers that prevent many from donating.

By doing this, we will be able to; provide the best match for patients, close supply-demand gaps, reduce waiting lists and ensure far fewer disparities across different ethnicities.

As we look to the future, our ambition is to save and improve even more lives, building a world where every patient receives the donation they need.

DOI: 10.1111/tme.12910

TRANSFUSION MEDICINE WILEY

ABSTRACT

Poster session: Blood donation (including donor safety)

PO1 | Voluntary blood donation motivational factors among first-time and repeat donors in Nigeria

Dr Adaeze Oreh[1], Mrs Agatha Nnabuihe[1], Mrs Syntyche Aliu[1], Ms Tariere Bozegha[1], Mr Christopher Irechukwu[1], Mr Yahaya Musa[1], Mrs Yetunde Fafowora[1], Mrs Grace Uzoma[1], Mr Baba Saleh[1], Dr Omale Joseph Amedu[1]

[1]*National Blood Service Commission*

Introduction: Insufficient safe blood supplies in sub-Saharan Africa are linked to low levels of recruitment and retention of voluntary unpaid blood donors. This survey aimed to study the association between donor motivation and the likelihood of retention of voluntary blood donors to inform and improve voluntary non-remunerated blood donor recruitment and retention strategies for sustainable safe blood supplies.

Method: A cross-sectional survey of 215 voluntary blood donors selected from mobile and fixed blood donation sessions in North-Central Nigeria was conducted between April and July 2021. Data was obtained on factors associated with donor motivation to return to donate blood in 3–4 months. Logistic regression models were used to test the factors that were predictive of their motivation and intention to return to donate.

Results: Blood donors were predominantly male (79.5%), educated at the tertiary level (82.3%), employed (81.4%), and repeat blood donors (65.0%). Majority of the donors were aged 26–35 years (39%) and were surveyed at fixed blood donation centres 66.5% ($n = 143/215$).

First-time donors were motivated to donate by appeals from celebrity influencers on social media [OR = 1.689, CI = 1.028–2.775]. There was however no significant association between gifts or souvenirs and donor motivation in first-time donors [OR = 2.018, CI = 0.788–5.165]. First-time donors were less likely to regard regular blood donation as a healthy habit [OR = 0.590, 95% CI = 0.406–0.859], donating to ensure adequate blood supplies during shortages [OR = 0.493, CI = 0.333–0.730], getting to know their HIV status [OR = 0.601, CI = 0.423–0.856], or donation as a religious duty [OR = 0.700, CI = 0.491–0.998] as motivation to return.

Repeat donors were less likely to be motivated by newspapers, radio, or television advertisements [OR = 0.513, CI = 0.274–0.962], or knowing the outcome of their screening results [OR = 0.461, CI = 0.246–0.864]. Ease of access of blood donation sites was not found statistically significant for either first-time or repeat donors on logistic regression analysis.

Conclusion: Sustainable voluntary blood donor recruitment and retention strategies should therefore consider the findings from this study. The observation of important motivational differences between first-time and repeat donors from this survey indicates that in voluntary blood donor recruitment and retention, there is no 'one size fits all' formula.

PO2 | The challenge of out of range full blood count parameters in donor screening

Dr Naim Akhtar[1], Mr Alvin Fabiana[1]

[1]*NHS Blood & Transplant*

Introduction: NHS Blood and Transplant (NHSBT) uses a predominately qualitative gravimetric method for haemoglobin screening, backed up by capillary point of care (Hemocue) with a numerical value. The Haemoglobin levels are stipulated in Blood Safety and Quality Regulations (BSQR, 2005) for male (>135 g/L) and female (>125 g/L) donors and are enshrined in UK law. Using full blood count (FBC) by venous sampling and analyser would be more accurate. However, recent experience exposes significant time and resource commitment to managing out of range results (OOR) in a healthy population.

Method: FBC results on blood donors were performed as part of a major clinical trial. Minor OOR changes were repeated, and if persisting were noted on an excel spreadsheet alongside more significant OOR for clinical review and donor management.

All significant OOR results from January 2021 to May 2022 were analysed for potential impact on donor deferrals and management.

Results: Significant OOR was noted in 3.8% (2521) from 65 884 donors. Only 1.6% donors were below the male and female haemoglobin thresholds, but accounted for 43% of the significant OOR results. Raised total white blood cell counts and neutrophils accounted for up to 20% of deferrals, albeit many changes were mild and physiological, having excluded any evidence of infection. Low platelet count (<150) was noted in 22% of significant OOR changes, in the absence of any evidence of a bleeding disorder or manifestations. Most of the very low (<50) results were related to difficult venepuncture and therefore factitious. A significant monocytosis (11%) was observed in the OOR results above threshold of 1.0. However, in majority of repeated results, it became apparent that some individuals, predominately male donors maintained the monocytes between 1.0 and 1.2 without any evidence of chronic myelomonocytic leukaemia or progression.

Despite explicit instructions, only a small proportion (25% or 638 donors) returned with a repeat GP FBC and result.

Conclusion: Using FBC as haemoglobin screening tool, will reveal significant OOR in other parameters, which will require donor communication

and management. Further investigation and option appraisal is warranted to consider whether certain OOR parameters can be safely ignored.

PO3 | Red cell phenotyping of the native blood donors from the foothills and middle hills of Uttarakhand India: A pilot study

Dr Manish Raturi[1], Ms Bhawana Adhikari[1], Dr Anuradha Kusum[1]
[1]*Swami Rama Himalayan University*

Background: Uttarakhand state is a multi-ethnic state of India, bordering countries namely, China (Tibet) and Nepal. It is inhabited by the Garhwali, Kumaoni, Jaunsari and Bhotiya as the local communities residing here. The red cell phenotyping in the Uttarakhand blood donors (UBDs) is not available to date. There is insufficient data on the actual prevalence of the minor blood types amongst the UBDs. We hypothesised that the regional multi-ethnic UBDs might be carrying some unique and rare phenotype which could be different from the rest of the Indians. Consequently, early detection of the same will help the native blood centres to arrange compatible blood for the patients who need this rare blood type as early as possible. Additionally, this study will help in contributing towards building a regional rare blood donor program amongst the UBDs.
Methods: Samples from 3023 random UBDs who came to our blood centre were included for extended antigen phenotyping from Feb'22 to May'22. At the time of donor screening, informed consent was taken. Amongst these, only direct antiglobulin test (DAT) negative, O typed donors got selected for red cell phenotyping of Rh (D, C,c, E and e), Kell (K, k), Kidd (Jka, Jkb) Duffy (Fya, Fyb), MNS (M, N, S, s), Lewis (Lea, Leb), Diego (Dia), Indian (Ina) and the Mur using commercially prepared monoclonal blood antisera (Ortho Clinical Diagnostics, Pvt Ltd, New Delhi, India). The study protocol was approved by the institutional ethics committee. It was funded by UCOST, Department of Science & Technology, Government of India.
Results: The prevalence of high and low frequency blood antigens, in our study was in sync with other studies in India for most of the antigens. Additionally, we also identified rare blood types namely, 3.3% ($n = 5/131$) Diego [Di (a + b −)] which is rare and found in <0.01% Caucasians, Blacks, and Asians and another rare 2.6% ($n = 4/151$) Indian [In (a + b −)] phenotype in our population.
Conclusion: In Uttarakhand and India, we currently need to establish a national and state level rare blood donor registry to provide antigen-negative compatible blood to patients who are either allo-immunised or those carrying a rare phenotype.

PO4 | Impact of the COVID-19 pandemic on donor sentiment at Irish Blood Transfusion Service donation clinics

Miss Manall Marakkar[1], Ms Amy Nolan[1], Ms Tina Selby[1], Ms Orla Cagney[1], Ms Allison Waters[1,2], Mr Mark Lambert[1]
[1]*Irish Blood Transfusion Service,* [2]*UCD School of Public Health*

Introduction: In March 2020, the Irish government implemented the first of many public health lockdowns to mitigate the impact of the COVID-19 pandemic. Social distancing and travel restrictions impacted the recruitment and retention of blood donors. Fear of COVID-19 infection was the main concern for donors, resulting in donation decreases. In response, the Irish Blood Transfusion Service (IBTS) switched to appointment-only attendance (by phone) at donation clinics; minimising donors attending clinics at the same time. The aim of this study was to assess, from the donors' perspective, the impact of public health measures at donation clinics.
Method: Anonymous self-administered survey questionnaires were distributed to three donation clinics (fixed platelet apheresis; fixed whole blood; mobile whole blood) in March 2022. Questionnaires gathered information on donor attitudes to the IBTS pandemic safety practices, donor appointment scheduling and frequency of their donations.
Results: A total of 467 donors participated across all three sites; 96% were classified as 'repeat' donors. Overall 97% of donors expressed feeling safe while donating during the pandemic, despite the fear of contracting SARS-CoV-2 infection. In addition, 83% of those surveyed stated awareness of challenges faced by IBTS and expressed their desire to continue donating despite public health restrictions. This desire was evidenced by 66% of repeat donors choosing to donate more often and 28% of donors maintaining their frequency of donation, during the pandemic. Donors stated a preference for the donation appointment system; however, a lack of appointment times and unattended phone lines after 5 pm resulted in a high preference for the introduction of an online appointment portal system.
Conclusions: Safety measures, staff attentiveness and introduction of phone appointments eased fear of infection and played an important role in donor retention and satisfaction.
It was clear that altruism was a motivating factor for donors to continue to donate during the public health emergency in order to provide some support to an overburdened Irish health system.
Since most donors in this study are repeat donors, their opinions make a valuable contribution to the betterment of the services provided by IBTS.

PO5 | Managing post-donation illness (PDI): Incubation periods and component withdrawal guidance for blood donation

Dr Angus Wells[1], Dr JB Muller[1], Dr Liezl Gaum[1]
[1]*NHS Blood And Transplant - Manchester Blood Centre*

Introduction: Blood donors are asked to report any illness (with the exception of minor colds) that arise within 14 days of donation. This is to allow the recall of any component that may have been inadvertently collected during the incubation period of an infection. NHSBT Clinical Support Team (CST) have relied on a controlled document to inform decisions about PDI and recall (DAT728).
The Standing Advisory Committee for the Care and Selection of Donors (SACCSD) is responsible for the UK Whole Blood and

Component Donor Selection Guidelines (WBDSG). At the onset of Coronavirus Pandemic, SACCSD added guidance for the post donation management of donations from donors who subsequently reported SARS-CoV-2 infection. *This allowed consistent practice across the UK and we therefore wanted to include more guidance on managing PDI in the WBDSG.*

Method: We wanted to base our new PDI guidelines on the existing datasheet DAT728 and started our project by surveying users to assess the usefulness of the information and if there were any gaps in coverage. A concise survey, with four questions was drafted and distributed electronically to CST staff. The survey was available for 7 days and participation was anonymous.

Once the responses were analysed, we restructured and expanded the contents of DAT728 in line with suggestions received. We also ensured the information was scientifically correct; we used JPAC risk assessments and peer-reviewed literature to form an evidence base for our proposed guidelines.

Results: Results of the survey confirmed the important utility DAT728 offered: 77% of respondents used the document weekly or daily and 85% of respondents confirmed the document was easy to use.

Several new infective conditions were added to the document. The new guidelines have been implemented in WBDSG as Appendix 4: Management of Post Donation Illness.

Conclusion: Our survey confirmed that WBDSG users valued guidance on managing reports of post donation illness. A scientific review of the literature was conducted to ensure all information are current and relevant to the purpose of the document. This guidance is now embedded within the WBDSG where it is available for all users, including those outside NHSBT.

PO6 | Behavioural evaluation of the initial rollout of FAIR for blood donors

Professor Eamonn Ferguson[1], Ms Sarah Bowen[1], Professor Chris Starmer[1], Professor Abigail Barr[1], Ms Katy Davison[2], Ms Claire Reynolds[2], Dr Susan Brailsford[2]

[1]*University Of Nottingham*, [2]*NHS Blood and Transplant/UK Health Security Agency Epidemiology Unit, London, UK*

Introduction: Recommendations made by the FAIR (For the Assessment of Individual Risk) team to move from a population-based approach to the selection of blood donors in the United Kingdom, to an individualised risk assessment based on sexual behaviour and history was accepted by SaBTO, and Government and implemented across the United Kingdom from June 2021. This means that all donors are asked the same questions and more men-who-have-sex-with-men (MSM) can donate blood. As part of the post-implementation evaluation, we conducted a series of studies to explore the behavioural impact of the policy, by asking: (1) are donor numbers affected and do more MSM donate, (2) are there any operational issues, and (3) how is the policy perceived by patients and the general public.

Methods: We conducted 3 studies. Study 1 captured a snapshot of donor demography and awareness by surveying donors daily between (11/10/21 and 6/12/21) across all 24 English donor centres ($n = 1857$ donors). In Study 2, we interviewed donor staff ($n = 4$). Study 3 surveyed donors, non-donors, MSM (sampled from Prolific) and recipients (sampled from the Sickle Cell Society and UK Thalassaemia Society) assessing perceived risk, emotional reactions, and awareness ($n = 785$).

Results: Overall 3.43% of donors were MSM with 4.22% new and 3.22% repeat donors. Staff reported that interactions were positive and perceived increases in MSM donors. Non-donors, especially MSM, expressed a strong willingness to donate and current donors to continue. Donors, MSM, and recipients were the most aware of the change and people from Asian communities and non-donors were least aware. While recipients perceived the risk of infection as the highest of all the groups and most unacceptable, these were still in the lower risk range. Recipients, on average, expressed more negative emotions towards the policy focused on safety, however, many saw it as a positive change. Staff felt overall that the policy was working well. The issue of discrimination against polyamorous donors was raised as were issues around terminology (e.g., Chemsex).

Conclusion: Behaviourally the policy change is positive and effective. However, awareness-raising, reassurance about safety, and terminology require further consideration.

PO7 | Altruism and incentives to voluntary non-remunerated blood donation in Nigeria and the United Kingdom

Professor Eamonn Ferguson[1], Ms Erin Dawe-Lane[1], Mr Oluwafemi Ajayi[2], Dr Bodunrin Osikomaiya[3], Mrs Abiola Okubanjo

[1]*University Of Nottingham*, [2]*Blood Transfusion Service*, [3]*Lagos State Blood Transfusion Service*, [4]*Action on Blood*

Introduction: The World Health Organisation recommends countries operate voluntary non-remunerated blood donation (VNRBD) systems. However, many countries, including Nigeria, have family-replacement and paid donors. It has been argued that donors in low- or middle-income countries, prefer to help family (i.e., kin altruism), and may resist donating to strangers. Thus moving to VNRBD requires understanding the altruism, incentives and barriers to VNRBD. We explore these factors across several cultural groups, and specifically consider the challenges and possible interventions for moving to VNRBD in Nigeria.

Methods: A cross-sectional survey was conducted across five groups: Nigerian people living (i) in the United Kingdom ($n = 97$) and (ii) the rest of the world ($n = 101$); (iii) Nigerian-Experts ($n = 60$); and (iv) Black ($n = 395$), and (v) White ($n = 452$) people living in the United Kingdom. We assessed knowledge about blood donation in Nigeria; altruistic motivations; attitudes to recognition, rewards and

incentives (RRIs); barriers to donating; and challenges and solutions for moving to VNRBD in Nigeria.

Results: Need-based rather than kin-based altruism, as well as reluctant altruism, were higher in blood donors. While for White communities, personal reputation gain was important for Nigerian communities' gift-exchange was important. Whilst Nigerian and other Black communities understand Nigeria's blood donation system, they do not understand its governance and are more likely to be motivated by, personal benefits and incentives. People from Nigerian and other Black communities do not trust the healthcare system and fear the donation process has negative health effects. Removing compensation for blood donation will be a major challenge to achieving VNRBD in Nigeria. Suggested solutions include community outreach to tackle cultural and religious hindrances, fair compensation (e.g., hot food), the use of financial lotteries and legislation outlawing selling blood.

COMPONENTS, DONATION, TESTING AND SAFETY, TISSUES, CELLS AND CELLULAR THERAPIES

PO8 | Therapeutic leukapheresis in acute promyelocytic leukaemia: Still cannot be tried anymore?

Dr Howon Lee[1], Jae-Ho Yoon[2], Byung-Sik Cho[2], Hee-Je Kim[2], Dr Dong Wook Jekarl[1], Dr Yonggoo Kim[1]

[1]*Department of Laboratory Medicine, The Catholic University Of Korea, Seoul St. Mary's Hospital,* [2]*Department of Internal Medicine, The Catholic University Of Korea, Seoul St. Mary's Hospital*

Introduction: Hyperleukocytosis (HL) in acute leukaemia is associated with various symptoms which were associated with high mortality. In acute promyelocytic leukaemia (APL), increased leukaemic cell burden from the disease or early treatment with all-trans retinoic acid (ATRA) could cause HL before induction chemotherapy.

Therapeutic leukapheresis removes massive leukaemic cells of the peripheral blood immediately and mechanically. However, concerns for coagulopathy during or after leukapheresis, hindered this procedure in APL. The efficacy of leukapheresis in APL was studied.

Method: This study was a retrospective, single-centre study followed by a collection of electronic medical records for newly diagnosed APL patients from January 2009 to March 2022. Among 329, 85 patients had white blood cell counts above 40 × 109/L before induction chemotherapy. Thirty-nine patients were initially treated with leukapheresis, and the other 46 patients were not. To study for efficacy of leukapheresis, the 30-day survival of each group was compared using the Kaplan–Meier method and the log-rank test. To study for adverse effects of leukapheresis; following intensive care events (mechanical ventilator, continuous renal replacement therapy), following severe bleeding events (central nervous system, pulmonary, gastrointestinal) were compared. In addition, post-leukapheresis transfusion data was collected as a surrogate parameter for coagulopathy; packed red blood cell (pRBC), platelet, plasma or cryoprecipitate.

Results: There was a trend towards favourable 30-day survival rates for the leukapheresis group compared to non-leukapheresis group (76.9% and 66.9%; $p = 0.24$). Once whole patients were divided into subcohorts with any leukostatic symptom ($n = 61$) or without symptom ($n = 24$), among symptomatic patients, survival rates of the leukapheresis and non-leukapheresis groups were 76.7% and 53.9%, respectively ($p = 0.03$). Mean survival days (95% confidence interval [CI]) of each group were 25.7 (95% CI, 22.8–28.6) and 18.4 (95% CI, 13.8–23.1), respectively. The complications including intensive unit cares ($p = 0.23$), severe bleeding events ($p = 0.13$), and frequencies of pRBC, platelet, plasma or cryoprecipitate per patient ($p = 0.39$; $p = 0.64$; $p = 0.18$) showed no difference between two groups.

Conclusion: In APL with symptomatic HL, from either disease itself or ATRA effect, therapeutic leukapheresis could be tried to reduce leukaemic cell burden without significant risks.

PO9 | Red blood cells adhesion in polycythemia vera: Lu/BCAM, Lw/ICAM

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Background: polycythemia vera (PV) is a chronic myeloproliferative neoplasm characterised by the JAK2V617F mutation, leading to elevate haemoglobin levels and red cell mass. Thrombotic and cardiovascular diseases are the major causes of death in a patient with PV. And JAK2V617F mutation is responsible for Lu/BCAM activation by phosphorylation and it is related to PV RBC adhesion to endothelial laminin. Confirmation of factors associated with thrombosis is needed to determine the most effective treatment for reducing the risk of thrombosis in patient with PV.

Methods: A total of 67 blood samples (37 for PV patients, 30 for controls) were investigated the characteristics of PV patients and controls. Also cell surface expression of Lu/BCAM (BV421 mouse anti-human BCAM, Becton-Dickinson) and Lw/ICAM (BV650 mouse anti-human ICAM-4, BD) using specific antibodies. LSRFortessaTM flow cytometer (BD) was used, as described.

Results: Among 37 PV patients, 27 were male and 10 were female. Age was 56 ± 15. 6. Haemoglobin (g/dl), WBC (109/L), platelet (109/L) counts were 16.0 ± 1.9, 9.4 ± 3.6, 371 ± 180, respectively. For controls, 17 were male and 13 were female. Age was 52 ± 13. 1. Haemoglobin (g/dl), WBC (109/L), platelet (109/L) counts were 15.0 ± 1.6, 5.4 ± 1.0, 240 ± 49, respectively. The mean fluorescence intensity (MFI) of Lu/BCAM and Lw/ICAM expression in PV patients was 3119 ± 1562, and 102 ± 39, respectively. MFI of Lu/BCAM and Lw/ICAM expression in controls were 2303 ± 1277, and 123 ± 61, respectively. Using the Mann–Whitney *U* test, WBC, platelet counts and the expression of Lu/BCAM and Lw/ICAM between PV patients and controls showed p value <0.05. On Haemoglobin count, p value was 0.056.

Conclusions: Based on our results, we confirmed Lu/BCAM activation by JAK2V617F in PV patients as previously reported and decreased expression of Lw/ICAM. A decrease in expression of Lw/ICAM is correlated with the decrease of destruction RBCs in the spleen. In Characteristics, PV patients showed higher WBC and platelet counts than controls.

Keywords: Polycythemia vera, red blood cell, Lutheran/basal cell-adhesion molecule (Lu/BCAM), Landsteiner-Wiener/intercellular adhesion molecule (Lw/ICAM).

PO10 | A case of severe thrombocytopenia and fragmentation haemolysis post PBSC harvest

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Significant adverse events associated with allogeneic haematopoietic stem cell donation are rare but are reported and therefore donor follow-up is required.[1] The World Marrow Donor Association (WMDA) recommends a minimum of 10-year follow-up.[2]

Haematological and biochemical effects of Granulocyte Colony Stimulating Factor (GCSF) administration and peripheral blood stem cell (PBSC) collection in healthy donors have not been comprehensively studied.[3–6] We report a case of PBSC donation associated with severe thrombocytopenia, reticulocytosis and raised Lactate Dehydrogenase (LDH), which lasted for several months.

A middle-aged voluntary donor was selected for PBSC donation. He had a normal full blood count (FBC) at assessment including a haemoglobin (Hb) of 142 g/L and platelet count of 196 $\times$ 10^9/L. His platelet count fell to 96 $\times$ 10^9/L (Hb-143) after 4 days of G-CSF, and to 60 $\times$ 10^9/L (Hb-134) immediately post-PBSC collection. His platelet count dropped further to 31 $\times$ 10^9/L (Hb-132) 3 days post-donation. At this point he had reticulocytes of 152 (normal range 20–80 $\times$ 10^9/L) and raised LDH of 466 (normal range 125–220 U/L), his blood film identified spherocytes and red cell fragments. Although asymptomatic, he was admitted for further investigation given the microangiopathic findings and thrombocytopenia. His liver and renal function, haematinics, coagulation profile, and plasma ADAMST13 levels were within the normal limits, and he remained asymptomatic. He was discharged 3 days later with a platelet count of 58 $\times$ 10^9/L (Hb-131) and continued to be monitored. His platelet count recovered to 206 $\times$ 10^9/L (Hb-136) on Day 8 post procedure. At 2-month post donation he continued with slightly elevated reticulocytes (95) but normal LDH (218). Eosin-5′-maleimide (EMA) binding did not detect hereditary spherocytosis. At 4-months his reticulocyte count was normal, but LDH marginally raised (232).

This case documents severe thrombocytopenia, with a nadir at day 3 post donation. We are unclear of the cause or significance of the prolonged raised reticulocyte count and LDH. There is a paucity of information in the literature regarding what is and is not 'normal' on haematological and biochemistry investigation post PBSC donation. Consensus informed by further studies are required to guide donor care.

PO11 | Platelet function and viability following cold storage within a medical transport box and an extended 14 day shelf life

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Introduction: UK guidelines allow platelet concentrates (PCs) to be stored for up to 7 days at 22 ± 2°C with continuous agitation, resulting in logistical barriers that prevent pre-hospital transfusion of PCs. These barriers may be overcome using cold stored platelets (CSPs) which can be stored at 4 ± 2°C, with no agitation, for over 7 days. This study investigated the storage characteristics of CSPs stored in a medical transport box alongside two dummy red cell units.

Methods: Three buffy coat-derived PCs in plasma and additive solution were pooled, mixed and re-split into three forming a room temperature control (RT Control), stored under standard conditions, a cold storage control (CS Control) stored in a refrigerator for 14 days, and a test unit (CS Credo) stored in a Credo original golden hour box from days 2–6, then a refrigerator until day 14. Four replicates were performed, with testing on days 2, 6, 8 and 14.

Results: By D14, CS units showed significantly reduced metabolic rates compared to RT Controls ($p < 0.05$); however, all units retained an acceptable D14 pH (medians: CS Credo = 6.91, CS Control = 6.93, RT Control = 7.20). There was a trend towards higher platelet activation in CS Credo units compared to CS Controls, but this did not reach statistical significance. Maximum aggregation responses to collagen declined steadily in both CS arms from a starting median of 67%. RT responses remained level until D8, then decreased more steeply to D14 levels of about 25% in all arms. Responses to TRAP-6 showed a similar pattern, with maximum aggregation better retained in RT units until D8, then falling more steeply to a D14 median of 35% compared to 50% in both CS arms.

Discussion: This study considered whether a PC could be stored alongside two red cell units in a Credo golden-hour transport box. The results suggest the storage characteristics of CSP held for 6 days in a Credo box before transfer to a refrigerator were similar to CSP stored for the 14-day duration in a blood bank fridge.

PO12 | Anti-HBc testing. reducing the risk of transfusion transmitted occult Hepatitis B infection (OBI)

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Introduction: Introduction of Hepatitis B surface antigen (HBsAg) screening (1970s) and pooled HBV DNA testing (2010) has reduced the risk of transfusion-transmitted HBV greatly with a current residual risk of a window period HBV-infected donation entering the blood supply around 1 in 1 million. This estimate does not include risk from OBIs (HBsAg negative, HBV DNA positive). Following two probable OBI transmissions, SABTO recommended the introduction of screening for antibodies to hepatitis B core (anti-HBc)—a marker for non-acute HBV infection. This was implemented in SNBTS on April 6th, 2022. All blood donors will be screened once then only new or lapsed donors (>2 years) will be tested.

Methods: Donations found repeat-reactive for anti-HBc (Abbott Alinity s) were subject to further testing by alternative anti-HBc assays (Murex anti-HBc Total and VIDAS anti-HBc Total II). Samples reactive in one or both assays were tested for other HBV markers including HBsAg, anti-HBe, anti-HBs and individual HBV DNA to confirm HBV status.

Results: In the first 2 months of testing the repeat-reactive rate is 0.35% (77 repeat-reactive donations). To date, 39 donors have

evidence of past HBV infection (66% female; 94% > 40 years; 61% white UK ethnicity; 97% previous donors) and 1 case of OBI has been detected (new male donor). Inconclusive results were obtained in 21 donors, 5 of which have evidence of HBV immunity possibly linked to vaccination and 16 did not confirm for anti-HBc. The OBI donor was reactive in only 2 of 3 anti-HBc assays, was anti-HBe negative and had low level immunity (59 IU/L).

Conclusion: Since the introduction of anti-HBc screening, 1 blood donor with OBI has been identified with occult HBV. Unusually, this donor had no evidence of anti-HBe and was negative for one of the anti-HBc assays. The initial rates of repeat-reactivity and confirmed past HBV infection in donors are as expected from risk assessments. Testing of archive samples to try and resolve inconclusive results, large volume testing of anti-HBc positive, HBV DNA negative donations to determine if low level DNA viraemia is present and lookback investigations of donors and recipients are planned.

PO13 | Modelling the outcomes of different red blood cell transfusion strategies for the treatment of traumatic haemorrhage in the prehospital setting in the UK

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Introduction: The limited supply and increasing demand of group O RhD-negative red blood cells (RBCs) have resulted in other transfusion strategies being explored by blood services internationally for transfusion in emergency setting.

Methods: The impact of three prehospital transfusion strategies (RhD-negative RBC, RhD-positive RBC, and no transfusion) on quality-adjusted-life-years (QALYs) of all UK trauma patients in a given year, and the subset of patients considered most at risk (RhD-negative females <50 years old), was modelled.

Results: For the entire cohort and the subset of patients, transfusing RhD-negative RBCs in the prehospital setting generated the most QALYs (141 899 and 2977, respectively), followed by RhD-positive RBCs (141879.8 and 2958.8 respectively), and no prehospital RBCs (119 285 and 2503 respectively). The QALY difference between RhD-negative and RhD-positive policies was smaller (19.2, both cohorts) than the RhD-positive and no RBCs policies in QALYs term (22 600 all cohort and 470 for the subset), indicating that harms from transfusing RhD-positive RBCs are lower (harms for 0.5 patients and ~0.3 babies, corresponding to 19 fewer QALYs), than harms associated with not transfusing any RBCs (600 additional deaths, ~20 000 fewer QALYs). The number of QALYs lost due to death from haemolytic disease of the foetus/newborn was ~12.4 (both groups).

Conclusion: While the use of RhD-positive RBCs carries risks, the benefits measured in QALYs are substantially higher than if no prehospital transfusions are administered, even for women of childbearing potential. Group O RhD-positive RBCs could be considered when there is a national shortage of RhD-negative RBC.

PO14 | Influence of donor age, sex, and ethnicity on high titre anti-A and anti-B: review of six million donations from two national blood providers

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Introduction: Some blood operators routinely screen blood donations for high titre (HT) anti-A/B to reduce the risk of a haemolytic transfusion reaction due to out-of-group plasma-rich components. The definition of HT positive differs between blood establishments and has yet to be standardised, but in England and Australia is considered to be a titre of 1/128 or above by direct agglutination test. We sought to understand donor factors that may be associated with the likelihood of a donor screening HT positive, as well as compare population level data between England and Australia.

Methods: National data from screening of nearly six million blood donations was assessed between 2018 and 2020 from Australia and 2018–2021 from England. Screening was performed with a Beckman Coulter PK7300 analyser using a microtitre plate saline direct agglutination test in both countries. The testing method was therefore very similar apart from the choice of reagent red cells (A_2B in England; A_1 and B cells in Australia). Samples were regarded as HT if positive at a titre of 1/128 or above.

Results: For both countries, the likelihood of a donor testing as HT positive was greater for females than males, declined with age and was dependent on ABO group with group O donors most likely to test as HT positive. However, the proportion of donors testing HT positive was consistently higher in Australia than England: overall, 14% of group O donations and 5% of group A donations in England tested HT positive, compared with 51% and 22% respectively in Australia. Data from England also showed that donors from Black, Asian or mixed ethnic backgrounds were more likely to test HT positive than white donors.

Conclusions: These data demonstrate that donor sex, age, ABO group and ethnicity affect the likelihood of testing HT positive. Minor differences in testing methods can have a significant impact on the absolute number of donors testing as HT positive or negative.

PO15 | How syphilis screening is helping to monitor FAIR

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Introduction: The FAIR donor selection policy (For the Assessment of Individualised Risk) was implemented across the UK blood services in the summer of 2021. We describe 10 months of syphilis surveillance post implementation. Recent acquisition of syphilis indicates a person is in a risky socio-sexual network whether they know it or not.

Methods: Routine monthly surveillance data (including plasma-only donations) were used to compare the number and rate of confirmed markers per 100 000 donations in the current year with previous years. The weekly NHSBT review of cases was used to determine in real-time if there was an increase in recently acquired infections in England.

Results: The syphilis rate in first-time UK donors nearly doubled to 80 per 100 000 donations in 2021 versus 2020 with higher monthly rates throughout 2021. The majority of the 110 cases in first-time donors were past or likely past cases (90, 82%); half reported sex between men and 27/90 (32%) were previously treated.

Recent syphilis rates, excluding plasma-only donors, were 2.12, 2.34 and 2.42 per 100 000 donations in 2019, 2020 and 2021 respectively.

Of the 42 recent syphilis cases in 2021, 27 (64%) occurred under FAIR. Fourteen (33%) were reported in MSM; 11 under FAIR and four in repeat donors. Of these, two donated non-compliantly under FAIR, one treated, one with a new partner, while 8 were newly compliant. In 2020, 11/40 (28%) recent cases were in MSM; 9 in repeat donors with four non-compliant to the 3-month deferral, all with regular partners.

In 2022, rates in repeat donors to the end of April are similar to 2021. In England two of 9 recent syphilis cases were in compliant MSM.

Discussion: In 2021 there was a doubling of syphilis in first-time donors, mainly past infection which suggests more messaging about past treatment is required. Recent syphilis has been increasing in donors, similar to but at a lower level, than the general population (12.2 per 100 000 population, 2020). 1 To date, post implementation data show good adherence to the new partner rules, and do not suggest any influx of increased risk donors.

PO16 | Initial monitoring of the FAIR policy for blood donation shows safety is maintained

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Background: The FAIR (For the Assessment of Individualised Risk) blood donor selection policy was implemented in the United Kingdom from June 2021. This was a change from a policy that asked everyone with sexual partners from increased risk groups not to donate for 3 months, to a more equitable approach based on specific sexual activities of individual donors. Part of the basis for change was the evidence that concluded the policy was unlikely to adversely affect safety or supply. Here, some initial monitoring data were reviewed to assess the post-implementation impact.

Methods: Routine surveillance of viral positive donors was adapted for real-time monitoring with a focus on recently acquired infections to indicate current at-risk activities. To assess safety, data were used to estimate the chance of not detecting very recently acquired viral infections made in the window period in the United Kingdom for the 3 years 2019–2021. Donations tested and found positive from convalescent plasma and plasma for medicine donors were not included.

Results: Surveillance data for 2021 included the first 6 months of FAIR. The rate of hepatitis B (HBV) in first-time donors was higher than in 2020 (48.8/100000 vs. 34.2/100000). These were long-standing infections in donations made before FAIR implementation. Rates of hepatitis C (HCV), HIV and HTLV were unchanged. There were no recent viral infections in first-time donors, and of three in regular donors, only one had donated post-FAIR. Three is in line with four in 2020 and two in 2019 and gave rise to an approximate one in two million chance of not detecting HBV, HCV or HIV window period infections among donations tested across the 3-years.

Discussion: The viral safety of the blood supply under FAIR has to date remained unchanged. Although HBV increased in first-time donors in 2021 this probably reflects increased diversity and/or more new males donating throughout the year. For further assurance, monitoring continues, and additional work is underway to test for other viruses that are not part of routine screening.

PO17 | A review of 10 years of transfusion transmitted infection investigations

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Background: Acquiring an infection through blood transfusion in the United Kingdom is very low risk. Risk reduction strategies include bacterial screening of platelets, donor selection criteria and screening tests. Haemovigilance systems for transfusion-transmitted infections (TTI) are passive, relying on clinicians to report. Furthermore, many viral infections are often investigated and reported years after transfusion.

Methods: Suspected TTI cases submitted to the NHSBT and UKHSA Epidemiology Unit between 2011 and 2020 were reviewed. Investigation outcomes were classified as possible, probable or confirmed TTIs, or 'not a TTI'.

A transmission is considered as such if an infection identified in a recipient was not present prior to transfusion and no alternative source of infection is identified. Transmission is classed as confirmed only if identity of the pathogen in recipient and donor samples is shown by sequencing.

Results: From 1037 suspected bacterial TTI cases reported, 1010 were investigated. Cases were not investigated if the donation pack

was discarded, leaking or not available for testing. One confirmed TTI (*Staphylococcus aureus*) and one probable TTI (*Staphylococcus epidermidis*) were identified.

One hundred and forty-four suspected viral TTI cases were reported and investigated. Sixteen were confirmed, six probable and four possible TTIs and the remainder excluded as not TTIs. Of the confirmed TTIs, 10 were due to HEV, two HAV, and HBV, HCV, HIV and parvovirus B19 were each linked to one case. The probable cases included two HEV and four HBV transmissions, and the possible cases two HBV, one HCV and one HEV transmission. All possible and probable HBV transmissions were linked to occult HBV donors.

Conclusion: TTI risk in the United Kingdom remains low, as two bacterial and 26 viral transmissions occurred in 10-year period when over 20 million blood donations were made. The confirmed TTI in 2015 was the first transmission since universal bacterial screening of platelets started in 2011 and 8 of 10 confirmed HEV transmissions were identified before universal HEV screening began in 2017. Clinicians should remain vigilant and consider transfusion as a possible infection source. Any such cases should be reported to the appropriate UK Blood Service promptly to allow full investigations and actions to be taken.

PO18 | A novel predictive model for CD34+ stem cell yield in autologous stem cell collections

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Introduction: Haematopoietic progenitor cells collected by apheresis (HPC-A) are the most common cell source for haematopoietic stem cell transplantation. HPC-A are characterised by surface expression of CD34, enumeration of which determines stem cell collection yield. Accurate prediction of CD34+ yield has important advantages regarding patient and donor management. Current methods are based on pre-collection CD34+ peripheral blood count and incorporate collection efficiency (CE) of specific apheresis systems. Recent real-life data analysis for autologous collections at NHS Blood and Transplant (NHSBT) sites demonstrated variable CE between individual procedures, which reduces the utility of current predictive calculations. We therefore developed and validated a new statistical model, not reliant on CE for the prediction of a target CD34+ yield of $>3 \times 10^6$/kg.

Method: We used prospectively collected data for autologous collections from the NHSBT Stem Cell Collection Registry between 2016 and 2019. All collections were performed on Spectra Optia devices (Terumo®) using the MNC programme. To develop the model, a multivariable logistic regression analysis with stepwise variable selection was performed on clinical and laboratory parameters of the first HPC-A procedure of the first mobilisation of 1211 patients. The model was subsequently validated with data from the first HPC-A procedure of the first mobilisation of 462 patients. ROC analysis was used to assess the predictive ability of the model.

Results: The final multivariable logistic regression model includes the following variables: pre-collection CD34+ count, total blood volume (TBV) processed, weight, sex, age, diagnosis group. Pre-collection CD34+ count and TBV had the strongest positive association with reaching target yield. The area under the ROC curve for the fully adjusted model was 0.975 which indicates strong ability by the model to discriminate between patients who reach the target CD34+ yield and those who do not. When fitted to the validation dataset, the final multivariable model had an area under the ROC curve of 0.942, again demonstrating strong predictive ability.

Conclusion: Our novel predictive model demonstrates strong ability to discriminate between patients who will have a successful first HPC-A collection. We hope to routinely utilise this model for NHSBT in the future to guide patient and donor management.

PO19 | A multi-centre international study comparing methods of cryoprecipitate production and testing

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Background: Cryoprecipitate manufacturing processes vary internationally. The starting plasma, precipitation method, equipment settings and the final cryoprecipitate volume contribute to variations in the final yield. In addition, the testing method employed at each blood centre/laboratory may impact results. In this study cryoprecipitate units manufactured at eight blood centres were compared.

Method: Eight blood centres manufactured 10 units of cryoprecipitate, following their standard procedures. Samples were taken from the starting plasma, the cryoprecipitate depleted plasma and the cryoprecipitate. Samples were tested for FVIII and fibrinogen using sites usual testing method as well as a standard sample preparation method for fibrinogen in cryoprecipitate. In addition, all samples were sent to England for centralised testing.

Results: Differences in cryoprecipitate fibrinogen yields were seen between blood centres, as well as between testing site (local/centralised) and sample preparation method (sites usual method/standard sample prep). Data corrected for the volume of starting plasma and tested at one site still showed variation in yield. Data is mean (SD).

Conclusion: In this study we found differences in cryoprecipitate fibrinogen yields internationally. The starting plasma volume accounted for the biggest variation, but methods of manufacture and testing also contributed to the observed variation.

		Local data			Centralised (NHSBT) data	
	Cryo volume (ml)	Sites usual method yield (mg/unit)	New standard sample prep yield (mg/unit)	Recovery/100 ml plasma (%)	New standard sample prep yield (mg/unit)	Recovery/100 ml plasma (%)
NHS Blood and Transplant	58 (2)	458 (103)	379 (83)	144 (34)	n/a	n/a
Australia Lifeblood	38 (2)	359 (94)	340 (88)	126 (34)	424 (118)	156 (45)
Welsh Blood Service	45 (1)	415 (124)	360 (90)	122 (30)	325 (87)	110 (29)
New Zealand Blood Service	113 (5)	823 (210)	807 (224)	129 (35)	932 (260)	149 (41)
Canadian Blood Services	31 (2)	279 (87)	240 (82)	83 (26)	290 (97)	99 (30)
Héma Québec	14 (1)	594 (131)	673 (155)	236 (55)	429 (110)	149 (37)
Irish Blood Transfusion Service	33 (2)	325 (13)	388 (76)	TBC	464 (97)	TBC
American Red Cross	23 (2)	547 (191)	TBC	TBC	451 (125)	137 (39)

DIAGNOSTIC SCIENCE AND TECHNOLOGY

PO20 | Anti-D in a 3-year-old female who has only been transfused D Negative components

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Introduction: This study reports the case of a 3-year-old female, blood group A D Negative, who received multiple transfusions of D negative blood components over an 8-month period. The patient had recently been diagnosed with stage 4 neuroblastoma and underwent surgery, radiotherapy, chemotherapy and an autologous stem cell transplant as part of her treatment. During this, the blood transfusion laboratory tested samples where the patient's antibody screen remained negative, and she was transfused with 25 units of D negative RCC's and 47 D negative platelets. One month later anti-D was detected in her plasma.

Method: The samples received were tested routinely for ABO/D group along with a red cell antibody screen. Following the positive antibody screen, extensive antibody identification was performed to positively identify the antibody present. Antibody quantitation was performed.

Results: Antibody identification revealed that the patient had developed anti-D, giving 1+ reactions by Bio-Rad technology, which were not enhanced by enzyme techniques. The auto control and DAT were negative. Similar results were seen on the 11 samples which were sent in over the next 4 months. We were able to rule out anti-LW and anti-G.

The patient's transfusion history confirmed she had received no D Positive components prior to or during her treatment. Each red cell and platelet donation was also checked to rule out D Variants, and all were confirmed to be D Negative components. The patient did not receive any other human derived products therefore we ruled out passive transmission of the antibody.

The anti-D quantitation gave a result of <0.1 IU/ml.

Four months later no red cell antibodies are detectable.

Discussion: As we were able to positively confirm no foreign stimulus for the formation of the anti-D in this young patient, we considered that this may be a naturally occurring anti-D. There are a few examples of Rh alloantibodies that are naturally occurring and are of the IgM type, but they are in the minority (Dean 2005). Its presence does not mean that the patient cannot additionally develop immune anti-D therefore we concluded that, if required, this patient must be considered for anti-D prophylaxis.

PO21 | High titre antibodies demonstrating prozone in two voluntary repeat blood donors

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Introduction: Prozone phenomenon occurs due to excess unbound antibodies leading to false negative reactions. For an ideal antigen antibody reaction to occur, antigen and antibody should be present in optimal concentrations to form a zone of equivalence. Excess antibodies present in serum can disturb antigen antibody ratio required for lattice formation and subsequent agglutination to occur. Diluting the serum to increase the cell to serum ratio can lead to resolution.

Methods: We describe immunohematology work up of two blood donor samples which were observed as blood group discrepancies. The cell grouping was O RhD positive, while the serum grouping was B in both the samples when the blood grouping was performed by an automated immunohematology analyser (FAIHA Diagast, Qwalys 3, France) based on the principle of erythrocyte magnetised technology, which on further workup turned out to be Type I blood group discrepancy.

Results: Blood donor 1—The first donor was a 42-year-old male, voluntary repeat donor. The anti-B antibody titre was determined by serial double dilution using tube technique. The IgM and IgG titers were 8 and 512 respectively. Prozone phenomenon could be remarkably appreciated. Blood donor 2—The second donor was a 40-year-old male, voluntary repeat donor. The IgM and IgG titers were 32 and 512 respectively with demonstration of prozone phenomenon. In the above-mentioned cases, high titre anti-B antibodies were present demonstrating prozone phenomena. An interesting feature of these two cases was that high titre antibodies demonstrating prozone phenomenon could have been missed if blood grouping was done by CAT (column agglutination technique) alone.

Conclusion: The immunohematology findings of these two cases emphasise that tube technique is an established and standard method for blood grouping. High titre antibodies demonstrating prozone phenomenon could have been missed if blood grouping was done by CAT alone as hemolysis which is to be taken as a positive result, can be best appreciated by tube grouping. Hence, this step should be incorporated as a preliminary step for blood grouping even if other techniques as CAT/automated analysers are functional in the lab.

PO22 | Multicenter experience evaluating new Anti-HCVII assay

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Introduction: According to the manufacturer's (Abbott) statement, the new Alinity s Anti-HCV II assay has improved sensitivity that will further enhance the blood screening performance of anti-HCV testing. The aim of this multicentre study was to evaluate the sensitivity and specificity of the new Anti-HCV II (Abbott) screening assay within blood donors 'population.

Method: Known positive samples and seroconversion panels were used to determine the clinical and seroconversion sensitivity of Alinity s Anti-HCV II assay. Total of 7532 samples from whole blood and plasmapheresis donors were tested in comparison to the corresponding assay on the Alinity s instrument by CMIA (chemiluminescent microparticle immune assay) to determine sensitivity and specificity for new Alinity s Anti HCV II assay. Two blood screening laboratories: Hong Kong Red Cross, Hong Kong (HKRC) and Scottish National Blood Transfusion Service, Scotland (SNBTS) participated in the study. Routine samples were fully anonymized.

Results: The clinical sensitivity of the assay was 100.00%. For the HCV Seroconversion Panels, the detection rates were 57.1% (8/14) and 14.3% (2/14) by Anti-HCV II and Anti-HCV assays respectively. The Seroconversion Sensitivity of Anti-HCV II assay improved by 42.8% (57.1%–14.3%) over that of Anti-HCV assay. The specificity of the Anti-HCV II assay on Alinity s was equivalent or better to the corresponding assay on the Alinity s instrument, with 100% versus 99.94% at HKRC, and 99.95% versus 100% at SNBTS, respectively.

Conclusion: The Alinity s Anti-HCV II assay detected all known positive specimens, had better seroconversion sensitivity, and generated fewer false-reactive results compared to the routinely used Alinity s Anti-HCV assays even though most samples were from donors previously screened with Alinity s assay. It was found applicable for donors' screening and acceptable to replace the current Anti-HCV assay running on Alinity s system.

PO23 | SARS-CoV-2 seroprevalence in Irish blood donors

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Introduction: This study aimed to track the progression of the SARS-CoV-2 pandemic in Irish blood donors over 2020 and 2021, thereby investigating the rate of infection and demonstrating the impact of vaccination in the population.

Methods: Blood donor samples received by the Irish Blood Transfusion Service (IBTS) between February 2020 and December 2021 were randomly selected and anonymised for analysis ($n = 10\,533$). Samples were screened by multiple chemiluminescent immunoassays for the presence of antibodies to SARS-CoV-2.

Results: Overall, a total of 2.34% of donor samples were positive for the presence of SARS-CoV-2 antibodies between February 2020 and March 2021. A significant increase in detectable antibodies was observed after the initiation of the vaccine rollout, with positivity rising to 11.89% in samples collected in February and March 2021. Antibody detection varied by age group, with the highest rate consistently detected in the youngest age category of 18–29 years. By December 2021, we report an overall seroprevalence of 97.04%. The rate of seropositivity indicative of natural infection during this time was 12.59% compared to 3.55% 1 year previously in November and December 2020.

Conclusion: These results demonstrate the essential role of blood services in contributing to infectious disease epidemiology data. The impact of the vaccination programme was evident by the sharp increase in SARS-CoV-2 seropositivity in the donor population. Sero-epidemiology in healthy individuals may be especially relevant to the management of future infection waves as testing criteria changes, vaccination booster programmes continue and a reliance on self-sampling and lateral flow testing increases.

PO24 | Case study: Haemolytic disease of the newborn caused by Anti-Wr^a

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Introduction: The Wr^a antigen is a clinically significant antigen that is part of the Diego blood group system. It has a prevalence of ~0.1% in Caucasian blood donors. Anti-Wr^a antibody is a rare cause of haemolytic disease of the newborn (HDN) although it can cause significant disease.

Case study: The patient is a Gravida 2, Para 1 Caucasian female, who had an uncomplicated first pregnancy. She was blood group A Rhesus D negative and received routine antenatal anti-D prophylaxis. She had anti-K earlier in the pregnancy that was not detectable at 40-week gestation. Prophylactic anti-D was identified on maternal antibody screen.

A baby boy was delivered at term and was noted to be jaundiced at 3 h post-partum. Hb was 11.9 g/dl and bilirubin was 173 μmol/L. Cord blood was DCT 2+, blood group A Rhesus D+. The baby was treated with quadruple phototherapy and intravenous immunoglobulin. Bilirubin stabilised and the baby was discharged at 6 days old but readmitted 1 week later as Hb was 4.7 g/dl. O negative neonatal compatible blood was transfused immediately.

Initial presentation was presumed to be due to Rhesus and possibly Kell alloimmunization. However the severe HDN prompted a search for rarer antibodies as a cause.

Examination of the neonatal sample at our reference laboratory showed DCT 2+, IgG 2 + with anti-Wr^a detected in the eluate. The maternal sample had a positive IAT and anti-Wr^a was identified.

Genotyping confirmed that the partner was Wr(a + b+) and mother was Wr(a − b+).

Discussion: This case highlights the importance of the search for low frequency antibodies in cases of HDN where the clinical picture does not match the serological findings. Discovery of this antibody was important for clinical management and has important implications for family counselling and monitoring of future pregnancies.

Wallis, J. P., et al. "The incidence of anti-Wr^a and Wr^a antigen in blood donors and hospital patients." *Transfusion Medicine* 6.4 (1996): 361–364.
Squires, Amanda, et al. "Hemolytic disease of the newborn caused by anti-Wright (anti-Wra): case report and review of literature." *Neonatal Network* 31.2 (2012): 69–80.

PO25 | Towards the safe introduction of genomics technologies in routine blood matching to improve quality of care for patients

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Introduction: Current blood matching practices cause avoidable harm to patients in the form of immunisation to non-self-antigens. Immunisation increases risk of inadequate blood availability, life-threatening transfusion reactions and at worst death due to no available blood. This disproportionately affects those with sickle cell disorder and thalassemia—people with no other treatment options. To improve care via extended matching of blood, a higher proportion of donors must be typed for the clinically relevant blood groups. In 2020 the Blood transfusion Genomics Consortium (BGC) demonstrated genotyping arrays could be used for cost-effective donor typing, observing only 72 discrepancies in 101 676 comparisons between genotype inferred Human Erythroid (HEA), Platelet (HPA) and Leukocyte (HLA) antigen types and those on donor record—the technology is now implemented in four major blood supply organisations, including NHSBT. However, current HEA genotyping algorithms do not consider full gene haplotypes but perform rule-based interpretation of genotypes using databases such as the ISBT allele tables. This means novel genetic recombination can result in erroneous positive types, an unacceptable error in patients.

Methods: With the goal of making the introduction of genomics technologies in donor and patient typing safer, we have begun creation of high-quality haplotypes for clinically relevant HEA genes. To do this we have curated the entire set of 1634 ISBT HEA alleles and used this resource to phase and type WGS data from 13 037 participants in the NIHR BioResource Rare Diseases Study.

Results: Using the *KEL* locus as an example; when considering the 114 known ISBT variants just 35 'alleles' (haplotypes) were identified, 7 of which were novel combinations. When considering total variation in *KEL* measured by WGS, we identified 1732 unique *KEL* haplotypes, 12 of which contained nonsense variants causing premature stops, likely resulting in a K/k null phenotype. Failure to consider these haplotypes could lead to an erroneous positive K or k genotype in a donor or patient.

Conclusion: High quality reference haplotypes for clinically important HEA encoding genes will improve care for patients by making the introduction of genomics technologies for reduction of immunisation risk via extensive blood matching safer.

Wallis, J. P., et al. "The incidence of anti-Wra and Wra antigen in blood donors and hospital patients." *Transfusion Medicine* 6.4 (1996): 361–364.
Squires, Amanda, et al. "Hemolytic disease of the newborn caused by anti-Wright (anti-Wra): case report and review of literature." *Neonatal Network* 31.2 (2012): 69–80.

PO26 | Laboratory IT and service consolidation: It's not all Doom and Gloom!

Mr Ben Holmes[1]
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Introduction: Path Links was formed in 2001 by uniting NHS (National Health Service) pathology services in Boston, Grantham, Grimsby, Lincoln, and Scunthorpe, creating a single managed network operating across the County of Lincolnshire.

Serving a population of ~1 million, it is the largest clinical pathology network operating in the United Kingdom. Laboratory services are provided at each of the Path Links sites offering Blood Transfusion, Haematology, Chemistry, Immunology, Cellular Pathology and Andrology services. Path Links processes 4.5 million specimens, performs 20 million tests and generates 5 million test reports every year. Blood Transfusion testing represents around 7500 samples per month across the five sites located within the County.

Methods: During 2021, we installed a combination of automated (Bio-Rad IH-500) and semi-automated (Bio-Rad Banjo ID-Reader) systems for ID-Cards. Since each laboratory had different workloads and testing needs; the implemented solution was tailored to each site. All instruments were networked through Bio-Rad's IH-Com software, to allow single point access to patient information, worklists, and results. IH-Com centralises data in a single database meaning only one connection to the LIS (Laboratory Information System) is needed.

Results: Additional IT support tools complemented the IH-Com connectivity. IH-Web software enabled requests and results to be remotely managed which allowed the more experienced staff to

provide support from home or during out of hours. IH-A^{b}ID antibody identification software could assist the Biomedical Scientists in decision making, providing suggestions for additional tests which can be ordered directly from the software itself. Unity Real Time QC (Quality Control) trending allowed for immediate cross site comparison of data points. Finally, BRiCare, Bio-Rad's remote support and monitoring system increased instrument availability and reduced response time for technical support calls.

Discussion: By implementing a network IT infrastructure, Path Links was able to demonstrate a massive saving in resources through consolidation of services and sharing of staff expertise across sites. A networked transfusion solution provides opportunities for improvements in quality and efficiency. Continued development of Bio-Rad's connectivity software with refinements and additions required by users will allow laboratory IT in transfusion to further advance alongside technology innovations and evolving staffing needs.

EDUCATION AND TRAINING

PO27 | A prospective interventional study to assess the impact of a 'structured compact training' on knowledge and skills of safe blood transfusion practices among nurses working in a tertiary care institute

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Introduction: There is scarce information on the baseline knowledge and practices of nursing officers in relation to administration of blood components. We set out to evaluate the influence of training on their knowledge and skills through Kirkpatrick's levels of Training Evaluation.

Materials and Methods: This interventional cross-sectional study of 7-month duration conducted in a tertiary care teaching institute involved 200 nursing officers. 100 were assigned to study/intervention group and 100 were assigned to control/comparison group by systematic random sampling. Knowledge was tested in different domains—blood components (A), pre-transfusion checks (B), transfusion process (C), post-transfusion process (D) and blood administration practice (E). The influence of training on their knowledge, attitude and practices was evaluated using the principles of Kirkpatrick's Level of Training Evaluation. The first level of evaluation was done 1 month after the training and the second level of evaluation was done after 2 months of first level. The third level of evaluation determined the extent to which the trainees apply their knowledge in their practices.

Results: The baseline knowledge scores of the intervention and the control group were similar—15.16 ± 4.11 and 15.02 ± 4.75 ($p = 0.831$). Post-intervention (phase I) after 1 month, the scores improved significantly for domain A, B, C, D and E to 4.3 ± 2.21 ($p = 0.0001$), 3.46 ± 2.15 ($p = 0.0001$), 7.02 ± 3.55 ($p = 0.0001$), 2.51 ± 1.46 ($p = 0.0012$), and 5.86 ± 3.61 ($p = 0.0018$) respectively. In phase II, after 3 months of training, and the scores were significantly better from baseline for all domains except E. For domain A, B, C, D and E, scores were 3.82 ± 2.46 ($p = 0.0001$), 3.53 ± 1.98 ($p = 0.0001$), 7.38 ± 3.87 ($p = 0.0001$), 2.48 ± 1.55 ($p = 0.0035$), and 5.86 ± 3.61 ($p = 0.95$) respectively.

Conclusions: Our study showed that baseline scores were low in the nursing officers. No significant difference was found in baseline scores in subject and control population. However, post-intervention, a significant improvement in scores was observed in the study group across all domains.

PO28 | Why has my SHOT report been withdrawn?

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Serious Hazards of Transfusion (SHOT) work collaboratively with the Medicines and Healthcare products Regulatory Agency (MHRA) to cover haemovigilance in the United Kingdom, reporting to SHOT is limited to certain categories. On average 4000 reports are submitted to SHOT, and ~15%–20% of reports are withdrawn each year for various reasons. Reports are withdrawn if they do not meet the SHOT reporting criteria which can be different to MHRA criteria. SHOT accepts reaction and error reports where blood components and products have been prescribed and collected. MHRA accept reports based on the reporting criteria of the Blood Safety and Quality regulations, which may attribute to the quality and safety of the blood from the selection of the donor up to and including the collection of the component. Breaches in local guidelines are not reportable to SHOT but may be reportable to MHRA.

During 2021, 1045 (25.6%) of 4088 submitted reports were accepted by both SHOT and the MHRA, highlighting the different reporting criteria. Seven hundred and twenty-eight reports were withdrawn by SHOT and this review was carried out to identify the common reasons for withdrawal.

Reports withdrawn from the SHOT near miss category accounted for 286/728 (39.3%). Components not collected accounted for 134/286 (46.9%).

The febrile, allergic and hypotensive reactions (FAHR) category accounted for 171/728 (23.5%) of reports withdrawn from SHOT, with 93/171 (54.4%) being mild reactions which are not SHOT or MHRA-reportable. Reports withdrawn as the reaction was not transfusion-related accounted for 69/171 (40.4%) of FAHR reports.

The remaining reports were submitted across other SHOT categories, accounting for 271/728 (37.2%) of withdrawals.

Clarity about what needs reporting and the rationale for withdrawal is vital to ensure effective reporting and use of resources. Where SHOT has withdrawn laboratory error reports these could remain MHRA reportable and require investigation. A detailed reporting guide can be found on the SHOT website to support appropriate reporting. To improve understanding the SHOT team are creating a new 'SHOT or NOT' reference guide on what is reportable to SHOT, MHRA or both. Additionally, a process review is being planned at SHOT to enable more timely feedback on withdrawn reports.

PO29 | A successful story of platelet refractoriness in stem cell transplantation

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A 52-year-old female with Acute Myeloid Leukaemia (AML), was treated with CPX351 and achieved morphological CR1 and was awaiting for stem cell transplant with intending cure. Whilst preparing for haematopoietic stem cell transplantation (HSCT), she relapsed and was treated with FLAG-Ida chemotherapy and achieved hypocellular remission, planning for a rescue stem cell transplant.

Whilst treated with chemotherapy she was found to have platelet refractoriness due to multiple human platelet antigen (HPA) and

human leukocyte antigen (HLA) class1-antibodies. It was really challenging to find compatible donors due to her uncommon HLA typing and multiple, significant (high MFI value) antibodies. Her platelet counts ranged between 2 and 8 × 109/l, associated with minor bleeding despite matched platelet transfusions. Hence it was challenging to start stem cell transplant conditioning chemotherapy.

The aim was to eliminate HLA and HPA antibodies and to improve the response to platelet transfusions before starting HSCT. Strategy was to start with plasmapheresis (PEX) and Intravenous Immunoglobulin (IVIG) from the start of the conditioning regimen on Day−8 alternatively together with Rituximab.

Most of the antibodies were significantly reduced or disappeared and had good platelet count with the treatment. HSCT was performed successfully, with FMC-RIC, minor blood group mismatched, HLA matched unrelated bone marrow graft. Neutrophil and platelet recovery occurred on Day +11 and +12 consecutively, without early stem cell transplant complications.

Prophylactic platelet transfusions are routinely used following HSCT. Refractoriness to platelet transfusions (RPT) may be observed in 10%–70% of patients receiving long-term blood component support. Among immune causes of RPT, HLA antibodies can be found in up to 20%–70% of patients receiving multiple platelet transfusions. Presence of HLA allo-immunisation leads to RPT in about a 30%–50% of cases.

Management of RPT due to HLA antibodies involves transfusion of HLA-matched platelet concentrates. In our case report, the aim of Rituximab+IVIG+PEX therapy was to improve the response to prophylactic platelet transfusions during the conditioning regimen and subsequent period of aplasia with hope of avoiding serious bleeding prior to platelet engraftment. Although it is not possible to prove that the patient would have fared differently without the therapy, this case suggests that removal of HLA-antibodies using PEX may have played a role in her favourable outcome.

PO30 | Urgent neonatal exchange transfusion of twin neonates with rare U negative thawed red blood cells suspended in SAGM

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Introduction: Transfusion of the neonate can occur because of bleeding, suppression, or lack of red blood cell (RBC) production; as well as destruction of their RBCs. Guidance states that neonatal units should be group O, compatible with maternal antibodies, <5 days old and preserved in citrate–phosphate-dextrose (CPD). RBC age is important due to the worsening state of their storage lesion over time. Potassium release into the storage medium can cause hyperkalaemia from large volume transfusion. Sodium adenine glucose and mannitol (SAGM) form the additives used for long term storage of RBCs. CPD in neonatal exchange units reduces the theoretical risk of toxicity from mannitol and adenine.

The case.

Here we describe the case of the early delivery of twins to a mother with a rare RBC requirement. The mother was known to have Sickle Cell Disorder and identified as S/s negative with clinically significant alloanti-U (titre = 256). The mother had an increased bleeding risk due to the presence of fibroids. Early Caesarean section was required at ~28-week gestation as middle cerebral artery Doppler identified foetal anaemia. RBC units were required for potential neonatal exchange at delivery. The mother was found to have satisfactory Hb >100 g/L. There were no 'wet' units available for either exchange of the neonates, or transfusion of the mother. The National Frozen Blood Bank identified only two units that were antigen negative for the maternal antibodies. Thawed RBC units are resuspended in SAGM, meaning they would not meet the neonatal exchange transfusion specification. With no other available units and the risk of severe morbidity/mortality to the neonates, the clinical team decided supply of the thawed units was required. Both twins were born with severe anaemia and were transfused with the thawed RBCs suspended in SAGM.

Conclusion: There was no negative impact from transfusion of the neonates with antigen negative thawed RBCs suspended in SAGM. Improvement in both neonate's anaemic state occurred. This demonstrates that there are occasions where the theoretical risk of additives in RBC storage medium is outweighed by the known risk of Haemolytic Disease of the Fetus and Newborn (HDFN) and anaemia in the neonate.

PO31 | A serologist's dilemma: Impact of novel therapies

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Introduction: Therapeutic monoclonal antibodies (TMAbs), which improve outcomes for haemato-oncology conditions, are moving through clinical trials and emerging in frontline practice. Therapies include anti-CD38 and anti-CD47.

Therapeutics can have a detrimental impact on transfusion management. TMAbs cause complications when interpreting serological results, delaying red blood cell provision. This is more significant during clinical trials, due to the secretive nature of drug design. The Red Cell Immunohaematology (RCI) or Hospital Transfusion Laboratory (HTL) may not be informed of trial participants. Even when TMAbs are established, a negative impact due to poor communication, is recognised in patients undergoing treatment.

Haemolytic Disease of the Fetus and Newborn (HDFN) occurs when a transplacental passage of maternal IgG antibodies bind to foetal red cells possessing the corresponding antigen (White et al, 2016).

Transfer has potential to cause haemolysis of foetal/neonatal RBC. Severe cases of HDFN can result in death of the foetus/neonate.

There is no therapeutic agent to counteract maternal antibodies posing a risk of severe HDFN. Frequent Hospital attendance, blood sampling and maternal/foetal monitoring are required. M281 is a novel therapeutic agent undergoing clinical trials in the United Kingdom to understand its ability to reduce the severity of HDFN in the presence of clinically significant antibodies.

Method: Samples were tested by IAT and enzyme IAT (Bio-Rad-IH1000 automated platform and manual). Anti-D quantification used AntiQuant Mk3 Rapid Flow Analyser.

Results: Anti-D serological reactivity was first identified in pre-natal patient plasma. Anti-D quantification (IU/ml) identified levels reduced as the pregnancy progressed, from a high risk of HDFN to low risk (pre-natal = 107; 37w = 10). Pre-natal anti-D results and associated risk of HDFN triggered referral of the case to the FMU.

Conclusion: The maternal anti-D level unusually reduced, creating a dilemma at 14 weeks. Laboratory testing process was questioned, and investigations repeated (archive sample gave consistent results). Report stated a problem with the sample, rather than the result. This case emphasises the need for clear communication strategies in novel therapeutics trials to reduce unnecessary pressure on staff, as well as, use of time and laboratory resources.

PO32 | An online miro based Multi-Organisational traNsfusIon hssT suppOrt netwoRk (MONITOR)

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Introduction: Higher Specialist Scientific Training (HSST) is a 5-year work-based programme of bespoke training for Clinical Scientists to become eligible to apply for Consultant Clinical Scientist (CCS) posts. Training is self-led through job planning with their employer. Since the introduction of the programme, many cohorts have started training to Consultant level. Members of the first enrolment have completed their training and are being appointed as CCSs. Training is rewarding, through the development of leadership and management skills, as well as, specialised clinical knowledge. Often there is only one CCS Trainee (CCST) at a site, or even an organisation. This can leave the trainee feeling overwhelmed and working in a silo with only support from peers that do not have experiential knowledge of the course. Here we describe an online Miro based Multi-Organisational TraNsfusIon HSST SuppOrt NetwoRk (MONITOR).

Methods: Miro, an online collaborative whiteboard was used to build agendas, support meetings with virtual tools, allow real time interaction of participants and capture of information.

The group meets at two monthly intervals. The format encourages leadership from all members through a rotational chair. This allows a varied agenda that is based on the chair's experiences, as well as items suggested by participating members.

Results: Thought mapping was used to construct the network's purpose:

A safe space to air views, share ideas as well as learning, gain support (emotional as well as directional) and create solution-based discussion.

So far discussion has focused on—Course work; Activities to reduce stress/improve wellbeing; Becoming a leader; Resources available to support training and the future role; Supporting/enabling future recruitment; Identification of training placements; Revision session planning for examination.

Conclusion: The formation of MONITOR has brought together all current Transfusion CCSTs (11) from six different organisations. This has broken down organisational barriers, reduced the feeling of silo working and overcome anxiety felt by members in relation to their training. The network aims to invite future transfusion CCSTs, as well as extend invitation to other CCSTs who feel they would benefit from the support of MONITOR.

PO33 | The relationship between the outcome of SARS-CoV-2 (COVID19) infections and patient blood group

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Introduction: The emergence of the SARS-CoV-2 virus implicated as the causative agent of COVID-19 disease started from an unknown origin in Wuhan, China. Classed initially as a respiratory illness with patients presenting with pneumonia and increased mortality, it rapidly became a global pandemic causing strain on healthcare systems worldwide. The journey from emergence to declaring it a pandemic has been followed by various research into its pathogenesis; understanding it's mode of transmission; viral molecular composition and the compounding risk factors such as age, ethnicity, gender, comorbidities and blood group that lead to susceptibility or resistance.

Susceptibility of the disease linked to the lack of anti-A antibodies shown by Zhao et al. (2020) and Bhattacharjee et al. (2020) indicated patients with blood group A as having a higher risk of COVID-19 infection when compared to other non—A blood groups as the patients with blood group B and/or O were less represented amongst their positive cases.

The aim will primarily be to investigate the infection rate of SARS-CoV-2 as shown by positive COVID-19 results in various ABO blood groups, and secondarily investigate their disease prognosis and mortality.

Method: Data, $n = 2534$ patients collected from the COVID REACT database from a trauma hospital in Southampton will be analysed to assess any relationship between the prevalence and outcome of the COVID-19 infections. Only $n = 1022$ patients had a reportable blood group—therefore only these patients will be included in the cohort for comparing any associated relationship.

Results and conclusion: There were no significant differences $p < 0.05$ observed based on a Pearson Chi square comparison between the ABO blood group and ICU admissions and mortality rates. Therefore, the null hypothesis is true and would not be rejected as similar outcomes were observed in all ABO blood group types in this study. This was also supported by the studies done by Latz et al (2020), with similar incidences of positive cases, admissions to ICU, and mortality between patients with A and non-A groups. Therefore, the blood grouping may not be included as a prognosis tool in the diagnosis of COVID-19 illness.

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PO34 | The Use of eculizumab and rituximab for hyperhaemolysis—A case report

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Hyperhaemolysis syndrome (HS) is a serious complication of red cell blood transfusion in patients with sickle cell anaemia (SCA) resulting in a drop in haemoglobin below that of pre-transfusion level. We report a case of HS that was managed successfully with eculizumab and rituximab.

A 65-year-old female with SCA and a background of previous hyperhaemolysis was admitted with chest pain and hypoxia (Sp02 89%). A diagnosis of an acute chest crisis (ACS) was made. On admission her haemoglobin was 67 g/L, with no historical or current red cell antibodies. She was transfused 2 units of packed red blood cells (pRBC) with intravenous immunoglobulin (IVIg) and methylprednisolone (MP). There was clinical improvement and her haemoglobin incremented to 87 g/L. Five days post transfusion there was evidence of haemolysis and she was given further MP and IVIG, however her haemoglobin fell to a nadir of 43 g/L. The case developed features of mesenteric and cardiac ischaemia. She was discussed at the local haemoglobinopathy MDT which agreed two further units of pRBC alongside 900 mg eculizumab. This led to clinical improvement and her haemoglobin incremented to 65 g/L. One week later she developed further hemolysis. She received further pRBC with MP, IVIG and further eculizumab, again with clinical improvement and sustained haemoglobin >70 g/L for 2 weeks. However, her haemoglobin dropped to 51 g/L with further evidence of haemolysis, the patient presented with new confusion and an acute kidney injury (AKI). The case was discussed again at local MDT and a decision was made to give a further 2 units of pRBC with IVIG, MP and Rituximab. She received 2 doses of weekly rituximab which resulted in a cessation in her fevers and a stabilisation in her haemoglobin. She was discharged from hospital 10 weeks after her initial admission.

This case supports the effective role of rituximab alongside eculizumab in the management of severe hyperhaemolysis in patients with SCA, which to date has only been evidence in a small number of case reports.(1) It also highlights the importance of communication with tertiary haemoglobinpathy centres in the management of complex patients to ensure they receive the best standard of care.

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PO35 | United Kingdom National External Quality Assessment Service (UKNEQAS) for Blood Transfusion Laboratory Practice (BTLP) Pre-Transfusion Testing (PTT)—Case study of unexpected reactions in EQA exercise crossmatch

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UKNEQAS BTLP PTT exercises comprise samples of whole blood (WB) for grouping and Rh & K phenotyping, plasma for antibody screening (+/−identification) and crossmatch (XM), and donor red cells (DRC) for XM, with donors selected to be antigen positive or negative. DRCs and plasma pools are prepared by an external supplier; donors are either antigen positive or negative to the corresponding antibodies in the plasma. WB is prepared at UKNEQAS from pooled ABO and Rh & K identical red cell and ABO matched fresh frozen plasma (FFP) donations.

For exercise 22R2, 'Patient 2' ('P2') (A D negative rr K-, anti-K), and 'Donor W' ('DW') (A D negative cde/cde K-) was intended to be IAT XM-compatible; pre-acceptance testing showed the XM to be incompatible.

Possible causes for the incompatibiliity were considered:-

1. 'DW' could be K+ or DAT positive; both were found negative.

2. 'P2' could have an antibody to a low frequency antigen (A-LFA); all plasma samples are screened for common A-LFAs. This was considered to the most likely cause at this stage.
3. A further five group A rr K- donations were crossmatched versus 'P2'. Three were XM-incompatible, ruling out an A-LFA and two were compatible. After A_1 typing these it was concluded that anti-A_1 was additionally present in the 'P2' plasma. A replacement 'DW' was prepared from one of the two compatible donations.

Following exercise distribution, a small number of participants contacted UKNEQAS, reporting 'P2' versus 'DW' as XM-incompatible, but could not provide an explanation using the exercise information provided. Overall, 100/749 (13.4%) participants worldwide and 90/368 (24.5%) in the United Kingdom & ROI reported 'DW' as incompatible with 'P2'.

It was considered that the reactions were likely to be due to anti-A at a low level and contact with the material supplier elucidated the cause. The plasma donations used to bulk out 'P2' were group A, but the donation containing anti-K in the 'P2' plasma pool was group O.

Similarly unexpected incompatible crossmatches can occur in hospital transfusion laboratories. Causes include transfusion of ABO-incompatible FFP, post-platelet transfusion where only ABO-mismatched was available, and immediately post-infusion of intravenous immunoglobulin (IVIg).

PO36 | The development of a transfusion practitioner (TP) competency framework for Wales

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Introduction: The Transfusion Practitioner (TP) role is undertaken by a variety of healthcare practitioners who play a key role in supporting safe and appropriate transfusion care.

The requirement for this role was first identified in 2002 in Health Service Circular 2002/009[1]. The role was subsequently established UK wide however the scope was never officially clearly defined, although attempts have been made in recent years[2]. As a result, significant variation occurred as it was left open to interpretation, an issue noted on an international scale[3].

Variations can also be attributed to the diverse qualifications and background of the individuals undertaking this role, as well as competing local organisational requirements and vision for the role.

This together with an ongoing requirement to improve standardisation of the role and to increase recruitment and retention, which was becoming increasingly difficult in Wales, identified the imminent need for the development of a TP framework to define core role requirements, career pathways and opportunities for future recruitment to the role.

Method: A task and finish group was established early in 2020 reporting to the Blood Health National Oversight Group (BHNOG).

The group undertook the following activities:

- A gap analysis of Job descriptions from members of the All Wales Transfusion Practitioners Group (AWTPG) identifying common core competencies and knowledge and skill descriptors for role
- Mapping against the Kings College Health Partners TP competencies[2]
- Scoping of suitable skill acquisition models including Benner[4] and Dave[5]

Results: The TP Framework was successfully introduced in December 2021 and has so far been used to:

- Develop a new Associate TP Job Description
- Inform the staff appraisal process, allowing easy identification of training needs for TPs
- Inform induction processes by identifying gaps in knowledge base (used by 8 new TPs across Wales since implementation)

Conclusion: This framework has provided TPs in Wales with the structure and clarity that is much needed in the role. As part of the staff appraisal process it will allow TPs the opportunities to develop and progress in their careers which in turn will assist in the succession planning for the role, encouraging recruitment and retention in a competitive healthcare environment.

PO37 | Applying ADDIE to construct an online PBM short learning programme for nurses: An African Perspective

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Introduction: Education is a barrier to the implementation of patient blood management (PBM), yet there are no postgraduate education opportunities in PBM for nurses in Africa. To address this need, the University of the Free State (UFS), South Africa, proposed an online short learning programme in PBM for nurses. To ensure an academically sound programme, the design team intentionally followed the ADDIE model (an acronym for Analysis, Design, Development, Implementation and Evaluation). The main aim of this study is to describe how the design team translated the analysis phase of ADDIE into the design and development of a fit-for-purpose online PBM short learning programme.

Methods: A institutional case-study was performed by the design team. In the analysis phase, an assessment of the need, the student, the content, and the context was performed. In the design phase we developed a blueprint to constructively align the scope, content, outcomes and assessment. The development phase included the production of materials.

Results: There is a need to widen access to PBM education (e.g., online programmes). The African student has a unique profile (e.g., language, socio-economic factors, digital literacy, and prior knowledge) that should be accommodated. Learning outcomes must be context specific to suit the target audience. Collaboration is a creative means to overcome limited human resources, and as a result, the UFS partnered with the South African National Blood Service to form a design team. The design team employed pedagogical principles to

ensure effective and engaging online learning. Authentic learning and assessment activities tailored to the African context were developed to foster participation and engagement. Content was divided into learning units which will be presented as bite-sized pieces of information (chunking). To enhance asynchronous learning, we built in the voice of the lecturer using conversational bridging text. Facilitated, interactive and collaborative activities with feedback were developed to ensure engagement, create collective knowledge and to foster a community of practice.

Conclusion: The use of a systematic design process such as ADDIE, provided a valuable roadmap for the construction of an online PBM programme.

PATIENT BLOOD MANAGEMENT

PO38 | Evaluation of ROTEM-guided therapy in the management of major haemorrhage

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Background: A major haemorrhage can occur in anyone and is associated with morbidity and mortality. Currently treatment includes blood transfusion using standardised 'shock packs', with additional transfusion therapy guided by standard laboratory tests (SLTs). However, inappropriate transfusions are associated with adverse effects, SLTs do not represent global haemostasis and have slow turn-around times (TATs). Rotational thromboelastometry (ROTEM) is a point-of-care test (POCT) which rapidly assesses in vivo haemostasis, advising clinicians of specific haemostatic deficiencies enabling individualised evidence-based therapy to terminate bleeding.

Objective: To assess the impact of ROTEM-directed treatment in patients with a major haemorrhage compared to standard shock packs. Study parameters include clinical outcomes and blood component usage. The study evaluated the correlation between ROTEM results and TATs to SLTs.

Methods: This retrospective study collected data from 232 major haemorrhage patients over 2 years at Gloucestershire Hospitals NHS Foundation Trust. Twenty-six patients were treated via shock packs (pre-ROTEM group) and the remaining 206 received ROTEM-guided treatment (post-ROTEM group). Patient demographics, blood component data and clinical outcomes (length of hospital stay (LOS), intensive therapy unit (ITU) admission and mortality) were compared between the two groups. Correlation analysis compared SLT and ROTEM results.

Results: Patient demographics were consistent across the treatment groups. The median number of fresh frozen plasma (FFP) units transfused ($p = 0.002$) and total number of components disposed ($p < 0.0001$) dropped in the post-ROTEM group. There were no other statistically significant differences in blood component data, LOS ($p = 0.819$), ITU admission ($p = 0.624$) or mortality ($p = 0.691$). There was strong correlation of the FIBTEM amplitude at 5 min (A5) with Clauss fibrinogen ($r = 0.859$, $p < 0.0001$) and the ROTEM calculation with full blood count (FBC)-derived platelet count ($r = 0.619$, $p < 0.0001$).

Conclusions: ROTEM-guided management of major haemorrhage reduced FFP transfusions and blood component disposal. Rapid POCT results were produced with strong correlation to SLTs. Large, randomised control trials are needed to assess the impact of ROTEM-directed treatment on clinical outcomes.

PO39 | Emergency use of group O red cells in Wales: intervention and outcomes on a national level

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Introduction: The All Wales Guidance for the Management and Use of Group OD Negative Red Cells was issued by the Blood Health National Oversight Group (BHNOG) to hospitals in Wales, and included recommendations relating to the use of emergency OD positive red cells for certain patient groups.

Method: A data capture tool has been developed to determine when emergency group O red cells were used in the management of major haemorrhage (MH) in adult males, whether it was D negative or D positive used (or both).

This tool is to be completed by local transfusion teams for every MH managed in their hospital(s) and returned to the Welsh Blood Service Blood Health Team (BHT) for analysis.

The BHT then produce a quarterly report of analysed data, benchmarked at an all Wales and hospital level, and against a key performance indicator (KPI) target of ≥80% compliance.

A dedicated working group reviews the report and adds comments and actions to be taken, before submitting to the BHNOG and sending to the hospitals.

Results: The quarterly reports show compliance to the recommendation and KPI, and allows an understanding of which hospitals have not yet adopted or implemented the use of OD positive as the emergency red cell provision for adult males, and of those that have, which are utilising this policy in practice to good effect or not.

They have also shown grey areas where the policy may not be as easy to implement as thought, and where the data capture process may not be accounting for particular circumstances.

The standing action for hospital transfusion committees (HTCs) is to review the quarterly reports and considers these points above, whilst continually seeking to overcome any barriers to compliance with the recommendation and KPI. The key points from discussions at HTCs are then fed back to the BHNOG for wider consideration.

Conclusion: The BHNOG has introduced a robust system for measuring and monitoring compliance to this key recommendation in transfusion practice, comprehensively benchmarking performance of hospitals across Wales, and creating an action and feedback loop to support continuous improvement.

PO40 | A recipient with Rh alloantibodies and Rh incompatible allogeneic haematopoietic stem cell transplantation. How to select transfusion?

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A 66-year-old, high-risk myelodysplastic syndrome patient underwent allogeneic stem cell transplant with the aim of curative intent.

He was A RhD-positive with a history of anti-c and anti-E antibodies [R1R1(DCe/DCe)]. He received allogeneic peripheral blood stem cell transplantation from HLA-matched O RhD-negative, rr(dce/dce) unrelated donor.

Early post-transplant period, his Hb dropped with elevated bilirubin. Red cell antibodies were negative throughout the period whilst

negative Coomb's (Should the term 'Direct Antiglobulin Test' be used rather than Coomb's?) test with unremarkable blood film. Patient required 6 units of RBC within first 20 days before RBC engraftment. His post-transplant period was uneventful with achieving neutrophil and platelet engraftment on day-13 and 19, respectively. Patient did not exhibit any evidence of haemolysis in further follow-up, with persistently negative red cell alloantibodies.

Incompatibility between donor and recipient for Rh-D occurs commonly in allogeneic HSCT. Donor-derived immune reactions against host antigens or host immunity that persists despite conditioning treatment may affect success of allogeneic transplantation. As our patient's pre-existent red cell alloantibodies with minor RhD incompatibility made the transfusion requirement further complicated.

De-novo development of anti-D after D-mismatched HSCT is a possibility. Therefore, transfusion of D-negative blood/blood components after minor RhD mismatched HSCT has been recommended as the standard. However, due to history of anti c and anti E alloantibodies in the recipient, need to take extra consideration about his transfusion. Although his antibodies were enzyme reactive prior to transplant, transfusing rr blood can boost production of anti-c antibodies. Therefore, transfusing R1R1 red cells during transplant period would be the other option, but it will cause alloimmunization to produce anti-D antibodies.

However, RhD-Positive, R1R1 blood was selected for our patient until engraftment and then switching to rr blood was indicated after full engraftment. Reasons for selecting R1R1 cells, to prevent boosting effect of anti-c antibodies, thereby preventing long term haemolytic effects until engraftment. If patient developed anti-D, is not significant as HDFN is not a concern here.

We conclude that patients with pre-existing anti-Rh alloantibodies and Rh-mismatch transplant is really challenging and may cause formation of new alloantibodies or haemolysis of donor-type erythrocytes and should be carefully followed-up for haemolysis after BMT, especially during post-transplant recovery phase.

PO41 | Isolated island transfusion—A case study

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The Princess Elizabeth Hospital, Guernsey, provides pathology services to ~63 000 patients across five Islands making up the Bailiwick: Guernsey, Alderney, Sark, Herm and the private Island of Brecqhou. Although primary care is accessible on all Islands, pathology samples are transported daily to Guernsey via commercial plane and boat, and blood products for off-Island transfusions are transported to Alderney by commercial plane. Evacuation from smaller Islands is provided in emergencies by RLNI, and patients needing specialist care are evacuated from Guernsey via specialist air-links. Although these procedures generally run smoothly, they are often affected by weather, flight cancellations and availability of transport out of hours; this was made increasingly challenging during the pandemic.

Being isolated from the United Kingdom, the transfusion department is self-sufficient through on-Island blood and platelet donation, with regular deliveries of special units from NHSBT. With no on-Island medical consultant service, the transfusion department has learnt from past experiences and guidance from NHS consultants how to deliver critical blood components safely when there is no evacuation plan, transportation for urgent products, or specialist laboratory investigations available. This case study will discuss how, out of hours, a complex cross match was performed for a critical ITP patient in Alderney, with a new strongly reactive suspected autoantibody post IVIG infusion.

The case.

Here we describe a known immune thrombocytopenia Alderney patient presenting with low Hb (67 g/L) out of hours, who was highly symptomatic with shortness of breath and fever. The patient (O Rh pos) had been grouped without complication and treated with IVIg prior to a routine operation. Subsequent grouping was unresolved, and crossmatch was incompatible. The patient had a history of cold agglutinins, but serology was unresolved with sample warming and washing. DAT showed IgG4+/C3d 4+. Panels identified an auto panagglutinin. No further testing could be completed. As per guidelines, ABO/Rh/K matched blood was selected, however were not XM compatible, so support was sought from the NHSBT consultant on-call.

Conclusion: Although there is a contingency system for blood/sample management on Island, this case demonstrates that collaborative working with open communication for assistance out of hours is critical for patient care in urgent remote situations.

PO42 | Reducing preoperative blood sampling for laparoscopic procedures: using transfusion data to inform practice

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Introduction: The NHS Tayside Maximum Surgical Blood Ordering Schedule for laparoscopic cholecystectomy required a group and screen (G&S) sample at preassessment to screen for red cell antibodies, followed by a day of surgery G&S, so blood could be issued perioperatively if required. It was identified that patients undergoing this procedure were rarely transfused and therefore we aimed to review whether the day of surgery G&S could be safely omitted.

Methods: A retrospective review was performed of transfusion data for patients undergoing gallbladder surgery in NHS Tayside hospitals for 2016–2020 obtained from the SNBTS Scottish Transfusion Epidemiology Database (STED), which links transfusion data with inpatient episode records. To investigate the reasons for transfusion, patient identifiers were obtained for transfused patients to allow review of

medical records. Transfusion rates were calculated for gallbladder procedures, and rates of emergency transfusion for laparoscopic cholecystectomy were calculated.

Results: 2618 patients underwent gallbladder surgery during the review period. Seventeen patients received transfusion—transfusion rate of 0.7%. Of 17 transfused patients, 2 received emergency intraoperative transfusion during laparoscopic cholecystectomy, 1 due to inferior vena cava puncture, 1 due to a challenging procedure with excessive blood loss, giving an emergency transfusion rate of 0.07%. Of the remaining patients who received transfusion, 13 underwent gallbladder surgery during an acute admission, and 2 received preoperative transfusion due to an underlying haematological condition.

Conclusions.

Review of transfusion data confirmed anecdotal evidence that transfusion rates, and specifically emergency transfusion rates during elective laparoscopic cholecystectomy were extremely low. These data were presented to surgical and anaesthetics clinical governance teams with the recommendation that the requirement for a G&S sample on the day of elective laparoscopic cholecystectomy was removed for patients without red cell antibodies. This was approved (Is this what authors meant?) in December 2021. There have been no adverse events relating to transfusion delays. We now plan an analysis of sample requirements for other procedures to further reduce preoperative sampling where it is safe to do so. Access to transfusion data as held within STED enables informed clinical decision making based on local experience.

PO43 | Perioperative anaemia—Achieving a national pathway in Wales

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Introduction: The Covid-19 pandemic has increased the fragility of the blood supply chain. In response the Welsh Blood Service (WBS) and the Blood Health National Oversight Group (BHNOG) have promoted the need for Patient Blood Management initiatives (PBM).

UK guidance on the first pillar of PBM, anaemia management[1,2,3,] is well established, however pathway implementation across Wales is inconsistent leading to avoidable transfusions. Development of an All-Wales Perioperative Anaemia Pathway would ensure equitable, prudent healthcare for pre-operative patients throughout Wales and avoid transfusion.

Methods: In July 2020, the BHNOG anaemia workstream engaged with multidisciplinary key stakeholders, primarily the Welsh Perioperative Medicine Society (WPOMS), having representation from Health Boards (HBs) across Wales. Virtual meetings outlining the current and proposed positions were held with the agreement to develop and implement an All-Wales Perioperative Anaemia Pathway. All HBs shared local guidance to establish baseline practice followed by a survey to support prioritisation of pathway standards. A pathway was agreed, against which benchmarking was performed to determine current compliance and barriers.

Results: At baseline, 50% (9/18) hospitals in Wales had a perioperative anaemia pathway. In June 2021, all 18 hospitals (100%) in Wales agreed to use the All-Wales Perioperative Anaemia Pathway[4].

Benchmarking against the agreed pathway demonstrated significant compliance across Wales. 15/16 (94%) hospitals responded using Haemoglobin >130 g/L for all patients and serum Ferritin and/or TSATs for anaemia identification in line with the pathway. With regards to anaemia management, 14/16 (88%) used IV iron for first line treatment of iron deficiency anaemia for urgent surgical patients, again in line with the pathway.

Conclusion: Prior to this work, only pockets of perioperative anaemia management existed across Wales leading to variation in pre-optimisation of anaemia. Engagement with stakeholders has allowed agreement of a deliverable All Wales Perioperative Anaemia Pathway, the standard to which all preoperative services within Wales should be working.

Next steps to support full implementation include; to seek support from pathology services to standardise testing and give same day results for all departments where possible; develop a digital anaemia audit tool and funding of a national anaemia coordinator to support implementation of the pathway Wales-wide.

PO44 | Current practice for ABO matching of platelet transfusions in three Hospitals in England

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Donor blood group	Patient blood group								Grand Total
	A neg	A pos	AB neg	AB pos	B neg	B pos	O neg	O pos	
A neg	75	35	1	1	1	15	57	43	**228**
A pos	33	549	3	31	5	93	42	224	**980**
AB neg		2	11	3		3	1	1	**21**
AB pos		11		11				4	**26**
B neg		1			1	1	5	2	**10**
B pos		13		1		42	2	11	**69**
O neg	4	7		1		4	124	52	**192**
O pos		14				7	15	347	**383**
Total	**112**	**632**	**15**	**48**	**7**	**165**	**246**	**684**	**1909**

Introduction: Platelet transfusions can result in both major (where the recipient has antibodies against the ABO group of the transfused platelets) and minor (where the recipient red cells are incompatible with the transfused platelet plasma) ABO incompatibility. Transfusion of ABO major incompatible platelets can lead to lower platelet count increments following transfusion whereas transfusion of ABO minor incompatible platelets has been associated with increased risk of haemolytic transfusion reactions [1,2]. Ideally transfusions should be ABO identical for platelets, but this is not always possible, particularly in an emergency. Platelets also have a short shelf life, 7 days, and it can be challenging to always have ABO identical platelets available whilst avoiding significant wastage.

Currently, the proportion of platelet transfusions that are ABO identical is unknown and was assessed in this study.

Method: Platelet transfusion data from three trauma hospitals in England with a time frame ranging from 6 weeks to 10 months (April 2021–February 2022) was collected. The blood group of the platelet donation was compared to the blood group of the patient/recipient.

Results: During this period 1909 platelet transfusions were recorded, these included both apheresis and pooled platelet transfusions.

The dark grey boxes highlight the ABO/RhD identical transfusions.

Out of the 1909 transfusions, 1299 (68%) were ABO identical whilst 610 (32%) were ABO non-identical.

536 (28%) of the transfusions were classed as Major ABO incompatible whilst 202 (11%) were Minor ABO incompatible, some were both. Of the ABO minor incompatible transfusions, 74% were donor Group A (150/202) and 18% donor Group O (37/202). Therefore, for minor-incompatible transfusions, 8% of platelet transfusions were group A donor to non-A patients and 2% were group O donor to non-O patients.

Conclusion: Most platelet transfusions in this study were ABO identical. For, those that were ABO non-identical, the majority were majorly incompatible. For transfusions that had minor ABO incompatibility, most were group A platelets to a non-A patient with a small number being a group O platelet to a non-O patient. Further studies are needed to understand ABO matching practice nationally.

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PO45 | Efficacy of cryoprecipitate versus fibrinogen concentrate in major obstetric haemorrhage: A retrospective real world observational review

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Introduction: Supporting fibrinogen levels during bleeding improves haemostasis[1]. In the obstetric population, fibrinogen levels are depleted early, with low levels correlating with more severe haemorrhage[2]. Existing evidence suggests that fibrinogen concentrate is non-inferior to cryoprecipitate[3]. In July 2020 we moved to using fibrinogen concentrate (Riastap) instead of cryoprecipitate within our local major obstetric haemorrhage (MOH) protocol. One year following the change in practice, we sought to review the impact on efficacy and safety.

Method: The MOH protocol was activated for 83 patients between July 2019 and July 2021 (40 in the year preceding protocol change, and 43 in the year following). Electronic patient and transfusion laboratory records were reviewed.

Results: The median usage of red cell units (2 units), fresh frozen plasma (2 units) and platelets (0 pools) was the same pre- and post-protocol change.

The median estimated blood loss was slightly lower following Riastap introduction (2.2 L compared to 2.5 L) and the median length of stay in hospital reduced from 3 to 2 days.

Prior to routine use of Riastap, the incidence of emergency hysterectomy or uterine artery embolisation in severe post-partum haemorrhage (>1.5 L) was 6.2%. This reduced to 4.2% following the protocol change.

There were fewer thromboembolic events following protocol change (0 patients vs. 1 patient pre protocol change). There were no deaths in either group of patients.

Discussion: This data supports existing literature that Riastap is equivalent to cryoprecipitate in terms of overall blood product use in MOH. Furthermore, it has pragmatic benefits (e.g., no requirement for thawing or cross-matching).

There is limited existing evidence regarding other clinically important outcomes (e.g., unplanned hysterectomy). The number of patients in this study is too small to draw any definite conclusions; however, the trend in lower rates of hysterectomy and embolisation post local protocol change highlights this as a topic for future research interest.

Only 1 patient had a thromboembolic event. However, they received neither cryoprecipitate nor Riastap, and so conclusions cannot be drawn other than to say that safety outcomes were equivalent pre and post protocol change in this small study.

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PO46 | How males are positively supporting the blood supply in Wales

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Introduction: O D negative (OD-) red cells are a scarce and valuable resource for use in emergency situations. Guidelines recommend the use of O D positive (OD+) blood for males and females not of child-bearing potential.[1,2]

Method: Adoption of guidance by hospitals across Wales has been variable, with some hospitals citing reluctance by clinical staff to implement or inability of remote issuing systems to select compatible blood. Cardiff and Vale University Health Board (CAVUHB), which is the largest user of blood in Wales and hosts the designated Major Trauma Centre (MTC) for Wales has successfully implemented the OD+ policy in emergency situations.

Results: During the weekend of 19th–20th March 2022, eight major haemorrhage protocols (MHPs) were activated by CAVUHB. WBS Stocks of OD+ and OD- units were 5.1 (608) and 4.5 (177) days (units) respectively on Friday 18th March. Over the weekend 91 OD+ and 20 OD− units were issued to CAVUHB to support transfusion requirements. Of these 33 OD+ units & 3 OD− were used specifically for MHPs. The average daily issue for OD− across Wales is ~40 units. Without the use of OD+ to support the MHPs this would have created a shortage of OD− red cells. WBS stocks of OD+ and OD− units on Monday 21st of March were 4.5 (533) and 3.7 (146 units) days (units) respectively.

Conclusion: The prudent use of OD+ units by CAVUHB in emergencies has ensured sufficiency of the blood supply of OD− units for patients in Wales. The implementation of the policy also highlights the importance of collaborative working across the blood supply chain to ensure sustainability.

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PO47 | Uptake of fetal D genotyping in a North London District General Hospital

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High throughput non-invasive prenatal testing (NIPT) for foetal *RHD* genotyping was recommended as best practice by the National Institute of Health and Care Excellence (NICE) in 2016[1]. The benefit of high throughput NIPT is that it allows women who are D-negative and carrying a D-negative foetus to avoid unnecessary treatment with anti-D immunoglobulin. This is important as anti-D immunoglobulin is a blood product that carries the risks common to all blood products and is also a finite resource for which there has previously been shortages. Routine use of foetal D genotyping was due to be introduced in our north London hospital in Spring 2020, however was delayed until Autumn 2021 due to the COVID-19 pandemic.

We reviewed our current data since the introduction of foetal D genotyping to assess uptake within the trust and inappropriate use of anti-D immunoglobulin. There were 144 D negative women eligible for *RHD* foetal genotyping from October 2021 to May 2022. 72 (52%) did not have a foetal D genotype sent, 69 (48%) did have a genotype sent. 12% of women with an estimated delivery date (EDD) of March 2022 had a genotype sent; 48% with an EDD in April; 50% in May; 60% in June and 74% in July. Of the 68 (48%) sent—43 were RHD positive (65%), 23 were RHD negative (35%), 1 rejected sample and 2 inconclusive results. Of 23 women who were identified as carrying a D Negative fetus, 1 received anti-D immunoglobulin for a sensitising event, 1 received it post-delivery.

These data suggest a relatively slow but increasing rate of uptake of foetal D genotyping in our hospital. The original implementation feasibility study worked on a probable percentage of 35% of foetuses being D negative which correlates with our data. Two women received anti-D immunoglobulin despite carrying a D negative foetuses, both of these events are currently under investigation by the hospital. Further qualitative work is required to explore the reasons behind the low uptake of foetal D genotyping in our community.

Reference

1. https://www.nice.org.uk/guidance/dg25

PO48 | An audit of blood usage, alloimmunization and transfusion reactions in orthotopic liver transplantation

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Background: Orthotopic liver transplantation (OLT) has high transfusion demands. The Maximum Surgical Blood Order Schedule (MSBOS) is 10 packed red cell (pRBC) units, 10 fresh frozen plasma (FFP) units, and 2 units platelets. When OrganOx normothermic machine perfusion is indicated, 3 units of pRBCs are used to preserve the organ. Furthermore, fibrinogen concentrate (FIB, 1 g) and albumin (HAS, 5% 500 ml) are also used in the perioperative period.

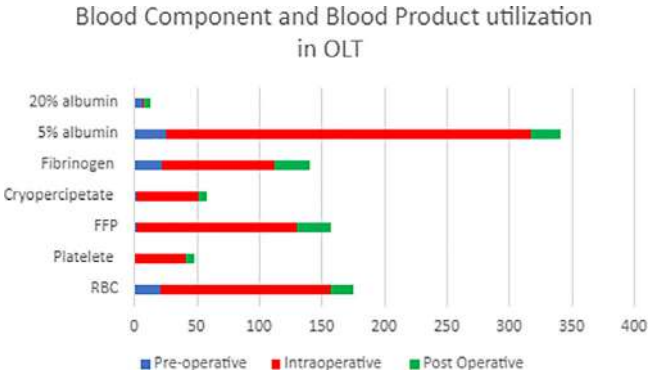
Aim: To characterise blood component and product utilisation for OLT patients at a major liver transplant centre in the United Kingdom during the perioperative period, defined as 1-week pre-transplant and 30 days post-transplant.

Methods: In a cross-sectional study, patient records from 1 December 2021 to 31 March 2022 were reviewed and included: demographics,

TABLE 1. Peri-operative blood component and blood product utilisation

	Pre-operative total (Range)	Average/ median (±2SD)	Intraoperative total (Range)	Average/ median (±2SD)	Post-operative total (Range)	Average/ median (±2SD)	Perioperative total (Range)	Average (±2SD)
pRBC	21(0–13)	0.64/0 (−4.08−5.35)	136 (0–20)	4.12/2 (−5.69–13.93)	19(0–6)	0.58/0(−2.12–3.27)	176(0–26)	5.33/3 (−8.43–19.10)
Platelet	1 (0–1)	0.03/0 (−0.32–0.38)	41 (0–6)	1.24/0 (−2.33–4.81)	6(0–2)	0.18/0 (−0.87–1.24)	48(0–7)	1.45/0 (−2.79–5.70)
FFP	2 (0–2)	0.06/0 (−0.64–0.76)	129 (0–20)	3.91/3 (−6.77–14.59)	26(0–12)	0.79/0(−4.21–5.78)	157(0–27)	4.76/3 (−9.86–19.38)
Cryoprecipitate	2 (0–2)	0.06/0 (−0.64–0.76)	50 (0–11)	1.52/0 (−4.03–7.06)	6(0–2)	0.18/0(−0.99–1.35)	58(0–11)	1.76/0 (−1.77–5.28)
Fibrinogen	22 (0–10)	0.67/0 (−3.88−5.21)	90 (0–17)	2.73/0 (−4.66–17.51)	29(0–16)	0.88/0(−5.24–7.00)	141(0–33)	4.27/0 (−10.31–18.85)
5% albumin	26 (0–9)	0.79/0 (−3.27–4.84)	291 (0–28)	8.82/8 (−1.16–18.80)	24(0–4)	0.73/0(−1.63–3.09)	341(0–32)	10.33/9(−1.59–22.26)
20% albumin	6 (0–2)	0.18/0 (−0.87–1.24)	2 (0–2)	0.06/0 (−0.64–0.76)	5(0–2)	0.15/0(−0.86–1.17)	13(0–3)	0.39/0 (−1.26–2.05)

Graph 1.



serology, perioperative utilisation of blood components and products, organ perfusion, cell salvage, transfusion reactions, and red cell alloimmunisation.

Results: A total of 33 patients were identified, (24 male; 9 female). Median age was 52 years (range: 28–68 years). Patients' blood groups: 11 A+, 2 A−, 10 O+, 2 O−, 7 B+, 1 AB−. Antibody screen was negative in 29/33 patients, including 1 patient's historical anti-M not detected in pre-transplant antibody screen. The antibody identification was positive in 4/33, (anti-E, anti-M, nonspecific, pan-reactive autoantibody). DAT was positive in 4/33 IgG only. There were 82% (27/33) of patients eligible for electronic issue.

OrganOx perfusion was used for 42% (14/33), and cell salvage was used in 85% (28/33) of cases with a median volume of 1476 ml (range: 502–8628) of blood re-infused.

Total units for 33 pts: pRBC 136 (0–20; median 2), platelets 41 (0–6; median 0), FFP 129 (0–20; median 3), cryoprecipitate 50 (0–11; median 0), FIB 90 g (0–17; median 0), HAS 291 ml (0–28; median 8). 15% (5/33) of patients used only albumin. Most components and products were given intra-operatively.

No transfusion reactions were reported. Red cell allo-immunisation occurred in 1 patient.

Conclusions: Component usage is 40% less than the MSBOS, and lower than comparable literature reports for the intraoperative phase. A powered study of patient blood management measures could identify factors leading to reduced use including cell salvage, use of OrganOx, use of albumin. This could contribute to restructuring MSBOS leading to better stock management.

No increased risk of alloimmunisation nor reactions was found compared to the general population.

PO49 | Retrospective audit to assess the outcomes of Ro units and to determine the percentage of Ro units not being used for sickle cell disease (SCD) patients in London Hospitals

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Introduction: The British Society for Haematology guideline on red cell transfusion in sickle cell disorder (SCD) recommends selecting Ro units for patients who are typed as Ro where possible. The National Comparative Audit, 2014 showed 67% patients with SCD who are transfused have Ro phenotype. It is estimated that the demand for Ro units rose by 75% between 2014 and 2016. Only 2% of blood donors in England have the Ro phenotype.

We aim to review the outcome of Ro units ordered by 5 London hospitals for patients with SCD, assess the proportion of the Ro units which are being used for non-SCD patients and identify measures to address this to improve provision of Ro units for SCD patients with Ro phenotype.

Method: A list of Ro units requested from 1 January 2021 to 28 February 2021 was identified from the laboratory information management system (LIMS) used in blood transfusion (BT) at respective hospitals. BT LIMS and electronic patient records were used to determine the outcome and clinical information.

One hundred and forty-six Ro units were over-ordered and re-issued to non-SCD patients. Other reasons for re-issue included patient not attending, vascular access issues, low HbS, high haematocrit/haemoglobin, covid −19 infection, cancelled procedures, circuit clotting, ward closure, transfusion reaction, palliation, serological

Results:

Hospital	No of Ro units ordered	No of Ro units to non-Ro patients, no SCD	% Of Ro Units to non-Ro patients, no SCD	Median age of units at re-issue	No of Ro units wasted
KCH	382	82	21.4%	7	5
HH/CXH/SMH	645	207	32.1%	19	5
NMUH	229	53	23.1%	17	1
Total	1256	342	27.2%		

incompatibility. In total 7 units were wasted as they were out of temperature control.

Conclusion: In total 342 (27.2%) Ro units were transfused to non-Ro patients with no SCD and 11 (0.8%) Ro units were wasted. Review of clinical practice aimed at ordering, timely assessment of patients, improving vascular access service and improving attendance is essential to prevent unnecessary diversion of Ro units. It also questions whether unused Ro units could be returned to NHSBT for re-issue to improve supply of Ro units for Ro patients with SCD. Quality assurance, logistics of handling units and other limitations must be considered.

QUALITY REGULATION AND GOVERNANCE (INCLUDING PATIENT SAFETY)

PO50 | Critical evaluation of the automated red cell exchange programme for the Treatment of patients with sickle cell anaemia at North Middlesex University Hospital

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Sickle cell anaemia (SCA) is a genetic condition caused by abnormal haemoglobin production in red blood cells. In 2017, North Middlesex University Hospital (NMUH) Trust purchased a Spectra Optia automated red cell exchange (ARCE) machine as a treatment option for their Sickle Cell disease patients. The decision was based on recommendations from the MTG28 NICE guideline 'Spectra Optia® for Automated Red Blood Cell Exchange in Patients with Sickle Cell Disease: A NICE Medical Technology Guidance' which stated it would increase the standard of care for patients by reducing iron overload, decreasing HbS% while not increasing blood viscosity. It also stated reduced expenses derived from patients being able to cease iron chelation therapy, which is often not well tolerated.

A retrospective review of 10 SCA (HbSS) patients was carried out to evaluate the success of introducing the automated exchange method and to assess the findings against the MTG28 guideline. The patients were assessed on iron overload using serum ferritin and R2-MRI scans for liver iron concentration, haematological parameters (Hb, HbS and Haematocrit [Hct]), alloimmunisation and cost. The assessment reviewed 1 year pre-ARCE against a year post-ARCE introduction.

The results showed no significant differences in serum ferritin values ($p = 0.401$) though 80% of patients did show an improvement in iron overload either by a reduction in serum ferritin, liver iron concentration or by being able to stop or reduce iron chelation therapy post-ARCE. The haematological parameters showed a statistically significant decrease in the HbS% ($p \leq 0.001$) and a significant increase in the Hb post-ARCE ($p = 0.2$), with no statistical significance found in the Hct ($p = 0.101$). None of the 10 patients developed any additional alloantibodies despite a statistically significant increase in red blood cell units transfused post-ARCE ($p \leq 0.001$). The financial assessment showed an increase in expense for the 10 patients post-ARCE, but savings were seen through reductions in iron chelation. Overall, the review highlighted the success of the automated exchange service at NMUH and confirmed the benefits set out in the MTG28 guideline for using Spectra Optia; however, a longer examination period with a larger number of patients would be required to substantiate the findings seen.

PO51 | Audit of antenatal anti-D referrals to RCI including changes to classification during pregnancy, adherence to BSH guidelines and re-referral compliance

Mr Robert Lees[1], Dr Mark Williams[1], Mrs Emma-Kate Chawishly[1]
[1]NHS Blood and Transplant

Introduction: NHSBT Red Cell Immunohaematology (RCI) laboratories test, quantify and provide clinical advice for referred antenatal samples containing anti-D antibodies to prevent and monitor the risk of Haemolytic Disease of the Fetus and Newborn (HDFN). The British Society for Haematology (BSH) guidelines for antenatal testing of antibodies during pregnancy were updated in 2016 ($_1$). The updated guidelines recommend that any anti-D detected prior to 28 weeks' gestation should not be assumed to be due to any recent prophylaxis and requires continual monitoring throughout the remainder of the pregnancy.

Method: A clinical audit was undertaken to determine RCI's compliance against this change in guidelines, to determine how many anti-D antibodies first reported as potentially Prophylactic pre 28 weeks were subsequently reported as Immune anti-D.

All antenatal samples with a reported anti-D received by RCI during the period 1st March 2019 and 28th February 2020 were reviewed. The final number of pregnancies included in the audit was 7359 with a total of 16 648 samples.

Results: • 63 pregnancies were identified where anti-D was classified as Not Specified before 28 weeks' gestation, but subsequently classified as allo immune anti-D by term.

• Seven of the above pregnancies had anti-D prophylaxis prior to 28 weeks' gestation and a concentration of anti-D which was consistent with prophylaxis, however developed a significant allo anti-D post 28 weeks.

• 38% of pregnancies reviewed, did not refer a sample post 28 weeks.

• 99.99% of reports reviewed were in line with RCI reporting process and BSH guidelines on all RCI sites.

• 100% of Allo anti-D antibodies reported were assigned the correct risk level based on quantification value and all had the correct clinical comments and advice as per RCI reporting process and BSH guidelines.

• 89% of anti-D antibodies referred to RCI were reported as Not Specified and repeat sampling required.

Conclusion/Actions: • Share results at the National Transfusion Lab Mangers meeting and with the BSH guideline writing group.

• Investigate ways to improve re-referral rates with users.

• Improve information received to allow appropriate allocation of anti-D and reduce the need for unnecessary referrals.

PO52 | A review into the suitability of medium short journey transport containers for delivery of red cell units by NHSBT

Mrs Helen Thom[1], Mrs Tracey Scholes[2], Mrs Deepa Takhar[1], Mrs Christine Gallagher[2], Miss Jenni White[1], Mrs Teresa Long[3], Mr Dapo Odumeru[1], Mr Mike Roberts[2], Mr James Hutton[3], Mrs Samina Mohammad[4], Mr Neville Robinson[5]
[1]NHS Blood and Transplant, [2]NHS Blood and Transplant, [3]NHS Blood and Transplant, [4]NHS Blood and Transplant, [5]NHS Blood and Transplant

Introduction: Approximately 136 000 deliveries are made by NHSBT each year. Va-Q-Tec transport containers are used to deliver 1.7

million units of red blood cells (RBCs), platelets and plasma. Containers are validated to inform the maximum time blood components are outside of controlled storage conditions and in the container for the purposes of delivery. Several quality incidents were reported to NHSBT involving cold chain errors where components had either breached the validation times as described in the NHSBT Capacity and Transportation Time Limits for Transport Containers document (DAT48) or the cold chain audit was not immediately available to the Hospital Transfusion Laboratory due to incomplete paperwork. These incidents involved RBCs transported in medium short journey transport containers, which are validated for 3 h. Guidance on which Va-Q-Tec transport containers are to be used for which hospitals, is provided in an NHSBT data sheet (DAT2057). Hospitals whose journey time exceeds 3 h from the Blood Centre are excluded from using the 3-h medium short journey transport container.

Methods: A retrospective review of cold chain errors involving RBCs transported in medium short journey transport containers recorded onto the Quality Management System was performed.

Results: The review identified a total of 46 cold chain errors involving RBCs transported in medium short journey transport containers over a 14-month period. The number of RBCs implicated in these incidents totalled 682. Of these, 397 RBCs were discarded having exceeded the box validation times.

Discussion.

DAT2057 was reviewed by stakeholders. The 3-h journey exclusion time now includes up to 60 min from leaving controlled storage conditions at NHSBT, the delivery time of a hospital on a journey and 30 min for the hospital to unpack upon receipt. A greater number of hospitals are now excluded from using the 3-h medium short journey transport container, and additional alternative boxes have been purchased to accommodate this. Improvements have also been made for paperwork completion. This work will greatly reduce the number of cold chain errors, preventing donations from being discarded and improving patient care. No incidents have been reported since the revised DAT2057 was effective.

PO53 | Errors and reactions associated with electronic issue of red cells

Nicola Swarbrick[1], Debbi Poles[1], Shruthi Narayan[1]
[1]*SHOT Serious Hazards Of Transfusion*

Introduction: Electronic issue (EI) is selection of red cells where compatibility is determined by the Laboratory Information Management System (LIMS). The objective of this review was to identify instances where EI resulted in adverse outcomes for patients and evaluate frequency of inappropriate EI use.

Method: Serious Hazards of Transfusion (SHOT) data from 2017 to 2020 was analysed and cases where EI was the stated method of crossmatch were reviewed for categories haemolytic transfusion reaction (HTR) and incorrect blood component transfused (IBCT) ($n = 137$).

Results: HTR were reported in 63/137 cases (1/63 paediatric): 15/63 acute, 43/63 delayed, and 5/63 hyperhaemolysis. 37/63 reported minor/moderate morbidity, and 8/63 major morbidity, of which 4/8 were sickle cell patients with 2/4 requiring emergency readmission due to hyperhaemolysis. 2/8 were related to antibodies to low frequency antigen Wra with one requiring admission to intensive care. 52/63 reported new red cell antibodies, and 31/63 positive DAT. Alloantibodies identified included Jka(18), E(9), Fya(7), C(6), Wra(6), c (4), K(4), Jkb(4), and one report of M, S, Lua and Cob. In all these cases EI was used appropriately.

Inappropriate use of EI was reported in 74/137 cases in the IBCT category (7/74 paediatric) with 1 resulting in minor/moderate morbidity. Clinical teams failed to inform the laboratory of known specific requirements in 4 cases. Laboratory errors included 38 reports where known historical information was not heeded including previously detected red cell antibody (17), recent (<3/12) ABO-incompatible solid organ transplant (2), and ABO-incompatible haemopoietic stem cell transplant (2). Incorrect use of LIMS was noted in 64/74 reports including failure to: update LIMS with specific requirement (17), heed alerts (13), access historical data (11), implement correct EI rules (6) or merge multiple patient records (2).

Conclusion: Electronic issue supports timely provision of blood, and remote issue of units from satellite refrigerators. To reduce risks from EI and improve patient safety, robust administrative and technical arrangements must be place and correct clinical information should be provided and updated on LIMS. LIMS alerts must be relevant, actionable, and not easily overridden. The risk associated with development of red cell antibodies must be balanced against the clinical need for transfusion.

PO54 | Specific requirement forms—Audit of turnaround times for forms to be available for bedside checklist

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[1]*Imperial College Healthcare NHS Trust*, [2]*NHS Blood & Transplant*

Background: The yearly SHOT reports highlight the number of incidents related to incorrect blood components specific requirements are not met. As a multisite organisation, we implemented a new pathway to ensure all forms were available electronically on the patient records (Cerner), setting the turnaround time for laboratory and clinical staff of 24 h (Monday–Thursday), 72 h if form received on Friday. Outside of routine working hours it was agreed that a copy of the form would be sent with any component issued to prevent any compromise in patient care.

The aim was to identify the time taken for;

1. Laboratory staff to update LIMS on receiving the form
2. Admin staff to upload form onto Cerner

Method:

1. All the forms received by the laboratory for 1 month, 1 year after implementation of the pathway were reviewed

2. All email trails from generic laboratory to generic secretary email reviewed to assess turnaround times
3. Date form available on patient electronic records 'Cerner' reviewed to assess when first available for bedside check

Results: Forty-six forms were received with a total of 19 diagnoses. Information was updated onto LIMS on the same day for all, with a 1-day delay for one UABD file. There was a wide range of diagnosis with 15 patients having joint care with other hospitals. Most forms were received Monday (11), Wednesday (10) and Friday (8). The number of days taken by the laboratory to send form to secretaries was 1 day for 23 forms, 13 took between 2 and 7 days, 8 took 8–14 days and 2 took 15 days. Twenty-four forms were delayed by laboratory staff batching forms. The secretaries loaded the forms on to Cerner within 24 h in 41 cases, the remaining 5 were done within 3 days.

Conclusion: The LIMS was updated on the same day for all 46 forms. There was delay in laboratory staff emailing forms to secretaries with batching of 24 forms, highlighting the need for further laboratory training to ensure better understanding of clinical importance of availability of the forms for bedside checking.

PO55 | Patient identification errors resulting in a wrong component transfusion

Mr Simon Carter-Graham[1], Dr Shruthi Narayan[1], Ms Debbi Poles[1]
[1]*Serious Hazards of Transfusion (SHOT)*

Accurate patient identification (ID) is vital to patient safety; it ensures that the correct blood component is given to the correct patient. Misidentification continues to be reported in several incidents submitted to SHOT and such errors can have potentially fatal consequences for the recipient. The use of a pre-transfusion checklist was recommended in the 2016 Annual SHOT Report and Chief Medical Officer CAS alert in 2017.

Method: Retrospective review of wrong component transfused (WCT) cases reported to SHOT 2016–2020 was carried out to identify incidents of patient misidentification. Use of pre-transfusion safety checks was also reviewed.

Results: 395 WCT were reported during this period and 49/395 (12.4%) were caused by ID errors using either manual or electronic pre-administration checks. These included 2 paediatric and 2 obstetric cases. There were 1570 reports of near miss wrong blood in tube errors caused by an ID error at venepuncture in the same time period. Distractions, multitasking, and concurrent emergencies occurring on site were identified as contributory factors—staff were distracted by events on the ward ($n = 9$), patients having concurrent major haemorrhage ($n = 5$) or dealing with multiple transfusions at the same time on the ward ($n = 9$). In 9 cases the checks were carried out away from the patient's side and in 5 cases wrong component collected from storage area without the error being identified.

In 20/49 (40.8%) cases, staff were up to date with transfusion training and competency-assessments but in 14/49 (28.6%) cases, staff were not fully trained/assessed. Pre-transfusion bedside checklist used in only 9/49 (18.3%), but the error was still not picked up. No deaths were reported due to the identification errors resulting in WCT, minor morbidity (rigours) was seen in 1/49 (2.0%) and major morbidity (haemolysis or admission) was reported in 5/49(10.2%).

Conclusion: Accurate ID is fundamental to patient safety, staff must avoid distractions during critical identification checks. Checklists are pause points along a process helping optimise safety with staff recognising and addressing any issues before any patient harm has occurred. Safety checks can only be effective when carried out appropriately. Recognising gaps in existing processes, use of electronic systems, empowerment of patients and staff will reduce misidentification errors.

PO56 | 2020 Annual SHOT report key recommendations survey

Dr Shruthi Narayan[1], Mrs Emma Milser, Mr Simon Carter-Graham, Mrs Nicola Swarbrick, Mrs Jessica Ryan, Ms Debbi Poles, Mr Fahim Ahmed
[1]*NHS Blood and Transplant*

Serious Hazards of Transfusion (SHOT) is the UK independent, professionally led haemovigilance scheme producing recommendations which are published in the Annual SHOT Reports and circulated to all relevant organisations. This survey assessed progress with implementing the key recommendations published in the 2020 Annual SHOT Report (July 2021).

An electronic survey (Online surveys) was emailed to all registered reporters in February 2022. Reporters were asked regarding progress and challenges faced in implementation.

A total of 84/171 (49%) responses were received and analysed representing all countries of the United Kingdom.

1: Transfusion delays, particularly in major haemorrhage and major trauma situations, must be prevented. 76/84 (90.5%) had systems for identification, escalation and blood provision in such situations. Regular training and simulation exercises were reported in 41/84 (48.8%). 57/84 (67.9%) had procedures for use of anticoagulant reversal agents without requirement for approval by a consultant haematologist. Anticoagulant reversal was included as part of regular training in only 45/84 (53.6%) and a fixed dose prothrombin complex concentrate regime with rapid access for administration in patients on anticoagulants with intracranial haemorrhage was in place in 44/84 (52.4) organisations.

2: Effective and reliable transfusion information technology (IT) systems should be implemented to reduce the risk of errors at all steps in the transfusion pathway. 39/84 (46.4%) organisations had implemented transfusion IT systems that support good practice and safe patient care, 29/84 (34.5%) were working towards implementation, 13/84 (15.5%) expressed difficulties with implementing and 3/84 (3.6%) had no plans to implement.

3: Effective investigation of all incidents and near miss events, application of effective corrective and preventive actions, and closing the loop by measuring the effectiveness of interventions should be carried out to optimise learning from incidents. 51/84 (60.7%) teams

indicated they had successfully implemented this and >21% indicated they were working towards implementation.

Staffing challenges, workload and resource issues, variable engagement, challenges related to the pandemic and training issues were recurring themes stated as barriers to training and full implementation of recommendations.

Understanding progress with implementing SHOT recommendations is essential to inform future direction and strategy. Identifying the challenges faced by frontline clinical and laboratory staff helps SHOT work collaboratively with all involved in transfusion to improve patient safety.

PO57 | Implementation of blood and prothrombin complex aboard the Cornwall Air Ambulance—making a difference

Dr Ian Sullivan
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Cornwall Air Ambulance was the first air ambulance service in the United Kingdom, started on 1 April 1987. It has now completed more than 29 000 missions. In 2021, the crew were tasked to over 1000 covering distances from the Isles of Scilly to the Specialist Burns Unit at Swansea, or the Children's Hospital in Bristol. Given the County's isolated beaches, rural settlements and challenging road networks, Cornwall Air Ambulance is considered a lifeline by residents and visitors alike.

In 2020, the Cornwall Air Ambulance Trust and the Royal Cornwall Hospitals NHS Trust started working together to implement 'Blood on Board'. Rigorous testing ensuring a complete and valid cold chain was performed prior to going live, along with a full governance system and KPI monitoring.

The Air Ambulance is issued daily with one blue box containing two O+ rbc and two group A FFP units for males >17 years and all patients >50 years of age, and a second red box containing two O-neg rbc and two FFP units for males <18 years and patients of childbearing potential <51 years of age. All boxes contain a temperature datalogger. As well as conserving O RhD negative rbc stocks, a secondary benefit to having two boxes is it allows a larger number of units for exceptional haemorrhage. In October 2021, the service expanded with the addition of Prothrombin Complex for the treatment of life-threatening haemorrhage or traumatic brain injury for those patients known to be on warfarin or some of the novel oral anticoagulants.

Blood on Board went live December 2020. To date, 18 patients have been transfused, receiving a total of 18 rbc and 33 FFP units. Several of these patients had a significant chance of pre-hospital death or serious life-altering deterioration had they not received transfusion. There have only been four units of rbc wasted.

Despite there being weak evidence of influencing mortality in patients receiving pre-hospital blood, blood on board the Air Ambulance has allowed the patient to be transferred to a Major Trauma Centre which would not have been feasible in the absence of transfusion.

PO58 | To transfuse or not to transfuse—the Ysbyty Calon Y Draig question

Rebecca Carnegie[1], Samantha McWilliam[1], Rachel Borrell[1]
[1]*Cardiff And Vale UHB*

Introduction: As the COVID-19 epidemic emerged in March 2020, the Cardiff and Vale UHB commissioned the Principality Stadium in Cardiff to become the 'surge' field hospital.

The Phase 1 plan was to use the Ysbyty Calon Y Draig (YCD) (Dragon's Heart Hospital) for patients' undergoing rehabilitation following COVID-19 recovery, step-down from ICU/HDU and ceiling-of-care following an end-of life pathway.

Phase 2 looked at moving the 'front door' as University Hospital Wales (UHW) became overwhelmed, to the YCD incorporating an admissions centre and rapid testing facility.

There was much debate between laboratory and clinical teams regarding the need for on-site transfusion facilities.

Method: There was a risk that patients housed at the facility may be suffering from underlying health conditions other than COVID-19 and could become unwell whilst resident at YCD.

The decision was made to place a satellite blood fridge, managed by the Blood Transfusion Laboratory at UHW, in the laboratory area at YCD for emergency use. It could also be used routinely, although there was no plan to offer routine transfusion on the YCD site.

Regulatory requirements meant suitable equipment had to be sourced, undergo qualification through change control and staff training requirements met.

This resulted in a multi-disciplinary operation against an extremely tight timescale.

Results: Training was delivered at both UHW and YCD to Band 3 Laboratory Technical Officers (LTO's) on the receipt and distribution of blood and blood components, as well as restocking, product recall, blood transportation and GMP.

GMP and collection training was arranged for the contracted porter staff at YCD.

Pre-transfusion sampling and blood administration training was delivered to clinical teams via dedicated training days at UHW.

Transfusion cover was provided within 4 weeks to include massive haemorrhage, routine and urgent transfusion. Four patients were transfused successfully during their rehabilitation in the YCD.

Conclusion: Blood Transfusion should always be considered in a hospital setting, even a field hospital, as patients often have underlying conditions that will require transfusion support. It is important to consider the regulatory requirements when establishing off-site transfusion facilities, no matter how temporary the facility may be.

PO59 | Evaluating the impact of root cause analysis (RCA) tools to help hospital transfusion teams investigate wrong blood in tube (WBIT) incidents

Miss Amber Johnston[1], Pamela Irving[2], Charlotte Brackstone[2], Dionne Bentley[2], Dr Charlie Baker[2], Dr Jane Graham[2]
[1]*Keele University*, [2]*University Hospitals of North Midlands NHS Trust (UHNM)*

Introduction: 'Wrong blood in tube' (WBIT) incidents occur when blood samples are taken from the intended patient but labelled with incorrect details or taken from the incorrect patient and labelled with the intended patient's details. WBIT incidents have the potential to result in ABO-incompatible transfusion and patient harm, with most incidents occurring due to human error. UHNM is a very high blood use establishment with ~1200 units red cells transfused monthly.

Method: In July 2017 the Hospital Transfusion Team at UHNM introduced WBIT root cause analysis (RCA) forms to be completed by staff involved in WBIT incidents to better understand the human factors that influenced their practice. Data from these forms was collated to target training and support the roll-out of electronic patient identification devices in transfusion.

Results: There were 43 WBIT episodes reported between July 2017 and December 2021 (mean 0.8/m; range 0–3 m). Completed RCA forms were available for analysis in 29 (67%), with 28 involving first WBIT events. The cause of the WBIT in 86% was either fully or partially attributable to staff not labelling the blood sample at the bedside from the patient wristband. In only 10% was the request form written prior to the phlebotomy episode. 27 (93%) healthcare professionals were aware of trust policy surrounding sampling for transfusion but said they did not follow this mainly due to under-staffing and excessive workload. Significantly, the second WBIT for one staff member involved the use of the new PDA system, where the wrong patient's label was printed and insufficient checks took place at the bedside. 90% of WBITs were identified once samples reached the pathology lab.

Conclusion: Our study suggests that the area to focus on to reduce WBIT incidents is the labelling of samples at the bedside. Further training on trust policy is unlikely to significantly reduce the number of WBIT events, although the need to complete the request form prior and take to the bedside should be emphasised. Vigilance must be used when introducing electronic identification methods as human factors will persist to negatively impact on safety but will be much harder to identify.

PO60 | LEAN Startup 1 year on—Development and implementation of a LEAN laboratory service in the hospital transfusion laboratory

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Introduction: The development of laboratory services can have an adverse impact if undertaken without customer input. LEAN Startup streamlines the creation of new ideas for customers by using its guiding principles and related tools (Value Proposition Canvas and Business Model Canvas). Collaborative working is supported to identify a fit between the service and what the customer wants. Implementation of 29 hospital networks has given Red Cell Immunohaematology NHSBT an opportunity to use LEAN Startup principles to develop and trial new services that are out with standard provision to customers. Here we describe a collaboration with the Bristol Royal Infirmary Transfusion Laboratory (HTL) to design and implement a Service aimed at improving sample flow and decreasing turnaround time for result generation.

Method: The Value Proposition Canvas was used to identify customer fears, problems and wants.

The Business Model Canvas was used to define the business components required to provide a LEAN Laboratory Service.

Miro, an online collaborative whiteboard was used to review current laboratory processes and design a new flow for the sample verification, automation and manual crossmatch processes.

Results: Value Proposition Canvas:

Customer fears—Waste present in the system; LEAN methodology not embedded; Impact on turnaround time; potential delay in results.

Customer problems—No defined activity cells, for example, manual serology; The laboratory layout is not optimal for sample flow.

Customer wants—Understanding of LEAN principles; Designated activity cells managed by staff; improved laboratory layout; A reduction in waste.

The Business Model Canvas identified that a service was required that provided LEAN continuous improvement expertise to the HTL. LEAN training was delivered to HTL staff. An online collaborative event facilitated redesign of the laboratory layout; three new cells were created—sample verification, automation, manual crossmatch. Mock-up of the layout demonstrated a reduction in waste for: distance travelled; flowtime; touch time and interruptions.

Conclusion: LEAN Startup was successful for creating a service that made a more efficient process in the hospital transfusion laboratory, reducing waste for the staff, as well as the time for blood readiness. The new layout has the potential to have a positive impact on patient treatment.

PO61 | LEAN Startup 1 year on—Development and implementation of a laboratory audit service in the hospital transfusion laboratory

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Introduction: The development of laboratory services can result in failure if undertaken without customer input. LEAN Startup streamlines the idea creation for customers by using its guiding principles and tools—the Value Proposition Canvas and Business Model Canvas. Collaboration is supported between provider and customer to identify fit between the service and customer wants. Implementation of 29 hospital networks has given Red Cell Immunohaematology NHSBT an opportunity to use LEAN Startup to develop and trial new services out with its standard provision. Here we describe a collaboration with the Bristol Royal Infirmary Transfusion Laboratory to design and implement services aimed at improving laboratory vertical audit process to assist in maintaining ISO15189 compliance.

Method: The Value Proposition Canvas was used to identify customer fears, problems and wants related to their vertical audit process.

The Business Model Canvas was used to define business components required to provide an audit support service.

Miro, an online collaborative whiteboard was used to review laboratory processes and design a new flow for staff training towards and completion of a vertical audit.

Results: Value Proposition Canvas:

Customer fears—Current process does not meet service or accreditation requirement.

Customer problems—SOP not fit for purpose; no training process; audit is paperwork based in a silo environment without looking at the process; No availability of staff to perform audit.

Customer wants—Training package; Assess current and build an improved future state; New documented process; Audits generate a final report.

The Business Model Canvas identified that a service was required to support vertical audit training and laboratory process.

An online collaborative event facilitated redesign of the current vertical audit training and vertical audit process. New training material was generated with assessment/sign off points. The flow of the process was improved, allowing pre audit planning, process viewing and report writing time. The new process allowed for oversight from the Hospital Transfusion Manager and Quality Manager.

Conclusion: LEAN Startup methodology was successful in creating a service that assisted in training laboratory staff to perform vertical audit. The vertical audit process created was streamlined and reduced vertical audit completion time.

PO62 | Anti-CD38 treatment for myeloma and pre-treatment testing compliance—A retrospective audit

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Anti-CD38 treatment for myeloma and pre-treatment testing compliance- A retrospective audit.

Daratumumab is a human monoclonal antibody used in the treatment of myeloma. It binds to CD38 antigens on the surface of plasma cells, the malignant cells in myeloma, which allows immune recognition and destruction.[1]

CD38 antigens are found on erythrocytes' surfaces. This can lead to complications in pre-transfusion compatibility testing due to panagglutination when screening for alloantibodies. It does not affect ABO or RhD typing.

The British Society of Haematology published a protocol in 2017 recommending that before anti-CD38 treatment:

- Test: ABO, RhD, antibody screen and identification, DAT, extended phenotyping or genotyping
- Blood should be matched for Rh, K and any alloantibodies

Following treatment, DTT treated reagent cells should be used for antibody screening.[2]

Pre-treatment testing at our hospital is performed when we consent the patient for treatment. We reviewed all myeloma patients started on an anti-CD38 over the past 3 years. We looked for where the transfusion tests were missed prior to anti-CD38 treatment and potential reasons. We looked at the laboratory and clinical consequences.

Pharmacy provided a list of patients treated with anti-CD38 between February 2018 and December 2021. We reviewed laboratory records to see whether the pre-treatment tests were performed prior to commencing therapy. For any missing tests, we liaised with our laboratory staff and the blood transfusion nurses looking for significant clinical or laboratory events. We reviewed patient records for further understanding of causes and implications in each case identified.

One hundred and seven patients were treated.

Seven patients did not have pre-treatment tests.

Four had genotype testing sent after treatment was started.

Three had group and screen samples sent leading to additional antibody testing, including sending samples to the Histocompatibility and Immunogenetics laboratory.

There were no delays in blood provision and no adverse clinical events were identified.

After discussion at our clinical governance meeting changes have been implemented. Anti-CD38 pre-testing is carried out for all new myeloma patients at diagnosis. Pharmacy have added a flag on the prescription to remind users before prescribing or administrating daratumumab. We hope these ensure that no further pre-treatment tests are missed.

PO63 | Assessment of adherence to BSH Guidelines on anti-D quantification monitoring of pregnant women receiving antenatal anti-D immunoglobulin (Ig) prophylaxis: An audit of a regional transfusion centre

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Introduction: Accurate laboratory identification and monitoring of red cell antibodies is essential for the early recognition of women at risk of haemolytic disease of the foetus and newborn (HDFN). Routine antenatal anti-D prophylaxis (RAADP) is offered to Rh D negative

women and has significantly reduced the rates of HFDN.[1] However, RAADP can complicate the laboratory monitoring of anti-D levels during pregnancy and it is important to determine if detectable anti-D is immune in nature or passive following the administration of anti-D Ig prophylaxis. The British Society of Haematology (BSH) blood grouping and antibody testing in pregnancy guideline provides an algorithm to guide management of women with detectable anti-D levels.[2] The aim of this audit was to assess if our monitoring of women referred for anti-D quantification to the West of Scotland regional transfusion centre was in accordance with the BSH guidance.

Method: We collected laboratory and clinical data for 45 women from the West of Scotland who were referred for anti-D quantifications between the 1st October 2020 to the 14th October 2021. Clinical portal records[3] were consulted to gather clinical information, including the frequency and stage of gestation anti-D quantification was performed.

Results: Most women (19/22) with a negative antibody screen at 28 weeks and subsequent anti-D concentrations of less than 0.2 IU ml^{-1} were reported as 'likely passive anti-D detected by IAT' and no further monitoring was performed, demonstrating good compliance with BSH guidance. Seven out of 10 patients positive for anti-D at 28 weeks or whose levels were greater than 0.2 IU ml^{-1} had further monitoring of anti-D levels at the recommended time intervals.

Discussion: The majority of samples referred in this audit period were appropriate and in accordance with BSH guidelines. Our results show the need for improved adherence to the guideline in those with immune anti-D to ensure that all patients have anti-D levels performed at the correct time intervals, highlighting the need for improved communication between the laboratory and clinical teams. One intervention to improve liaison with the clinical teams has been the initiation of an antenatal multi-disciplinary team meeting within our regional transfusion centre.

PO64 | Remote issue of red cells by non-registered staff

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Introduction: Release of compatible red cells for transfusion has historically been restricted to biomedical staff registered with the Health and Care Professions Council (HCPC) at Agenda for Change (AfC) band 5 and above. The advent of smart fridges and electronic blood tracking systems has allowed registered clinical staff to release red cells via remote issue (RI). This process enables rapid access to red cells but takes registered staff away from direct patient care. RI was introduced into this hospital in 2017, using the Haemonetics BloodTrack system installed at blood fridges in the laboratory, main theatres, orthopaedic theatres and labour ward. Following discussion at Governance level it was agreed that non-registered clinical staff at AfC band 2 could perform RI. In 2018 laboratory non-registered staff at AfC band 3 were trained and competency assessed to perform RI, reducing the pressure on registered staff performing electronic issue (EI). The laboratory information management system (LIMS) controls safe and appropriate release of red cells for RI for all patients, including antigen matched based on age/gender, chronically transfused, specific requirements (irradiated, CMV neg). All patients who are EI eligible can have blood released by RI, no requirement for stocking fridges with only K neg.

Aims: To review the safety and cost effectiveness of utilising non-registered staff to release red cells via RI.

Results: A review of 6334 red cells released via remote issue (RI) was performed, on average RI accounts for 23% of all red cell issues. Five hundred and fourteen staff are enabled to perform RI, 145/514 unregistered (laboratory and clinical). RI accounted for 2225 red cell releases by clinical staff. RI accounted for 39% of red cell collections from the remote fridges in theatres and labour ward.

Non-registered laboratory staff performed 170 RI, unregistered clinical staff performed 454 RI from the remote fridges. No patient safety events were reported resulting from RI, the BloodTrack system generated 89 alerts during RI (30 by non-registered clinical staff), the majority relating to failure to scan the compatibility tag in the required timeframe, no units were taken to the clinical area following an RI alert.

Time required for EI in lab is ~5 min, longer if includes a telephone call from the clinical area, booking in to LIMS, selection of units from the stock fridge, scanning into LIMS, completing EI process and labelling. RI takes less than 2 min, access Haemobank, scan in pick-up slip, release and labelling of red cell. RI by registered clinical staff costs ~55p per red cell unit compared to 30p for non-registered staff. EI by registered laboratory staff costs ~£1.40 compared to 32p for RI by non-registered staff.

Discussion: RI by non-registered staff in the laboratory and clinical areas provides a safe and cost-effective method for red cell issues. Using non-registered staff in the laboratory addresses the recruitment and retention challenges for registered staff, allowing them to focus on more complex task such as serological crossmatching and antibody identification. In the clinical areas registered staff can remain in clinical area providing direct patient care while unregistered staff can access red cells via RI.

PO65 | Improving transfusion practice in patients with thalassaemia and rare inherited anaemia (RIA)—Results of a local haemoglobinopathy multidisciplinary team quality improvement project (QIP)

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Background: This QIP reports on plan-do-study-act (PDSA) cycles undertaken by members of a local haemoglobinopathy team (LHT) to uphold national standards for patients receiving chronic transfusion.

Method: A database of haemoglobinopathy patients requiring chronic or frequent transfusion was created by the clinical LHT and shared

with the transfusion laboratory. Audit of the laboratory information management system (LIMS) was undertaken for each patient regarding antibody status, phenotype/genotype and transfusion flag. Flags were updated, additional investigations sent and the relevant standard operating procedure (SOP) covering special requirements updated. The LIMS audit was repeated annually for 2 subsequent cycles. In 2022, the SOP was audited against the guidelines, as well as clinic letters and actual units administered over the preceding 13 weeks. Structured feedback from patients and staff was gathered regarding transfusion logistics and risk perceptions.

Results: This QIP included 9 thalassaemia, 2 Diamond-Blackfan anaemia (DBA) and 4 'other' RIA patients. Current or historic antibodies were identified in 8 (53%), most commonly anti-K and anti-Kpa. No patients developed new antibodies during follow-up.

LIMS flag compliance for Rh/K matched red cells improved from 73% to 87% to 100% for all pts; <14 days to 100% in thalassaemia/DBA patients; large unit to only 38%. Audit of the laboratory SOP highlighted omission in the specification regarding large units, and <14 days for RIA. All administered units met the specification (volume not documented). Clinic letters clearly stated frequency and volume of transfusion, although omitted target trough Hb in DBA patients.

Only 4/9 patients 'always' or 'often' had their transfusion started <30 min after arrival although all hospital staff were aware of this recommendation (9/9). Delays were most common in the community setting and in patients with peripheral access. A third of patients were unable to list any potential risks of transfusion.

Conclusion: Delivery of safe and appropriate transfusion for patients with thalassaemia and RIAs is achievable by LHTs through close collaboration between clinical and laboratory staff. Making changes to improve practice does not always result in the planned improvement and frequent re-audit is necessary to ensure excellence. Educating staff and empowering patients is an important element, although logistical challenges often prevail.

PO66 | Creating an auditable major haemorrhage protocol

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Background: A London district general hospital implemented a Major Haemorrhage Protocol (MHP) in 2018 to improve the outcomes of massive blood loss and the efficiency and monitoring of major transfusions. Whilst potentially lifesaving, major transfusions are associated with significant risks [1]. In auditing MHP use at this hospital 3 years after its implementation, we found no direct link between protocol activation and clinical scenarios.

Aim: The aim was to review MHP use by creating an intuitive proforma that associated clinical details with each protocol activation. This would allow retrospective analysis of the protocol and hard patient outcomes in order to improve the use major haemorrhage protocol.

Methods: A single-sided paper form was designed to include information on timings, locations, and type of products requested. This required completion by transfusion lab staff whenever the protocol was activated. If blood products were dispensed, the lab would be contacted and subsequently would document the patient identifier onto the proforma.

Results: By cross-referencing the proformas completed by the lab staff and the major haemorrhage calls activated through switchboard, we determined that all activations were being recorded on the proformas. Importantly, in the first round of data collection we found that of 27 major transfusion requests (>4 units of packed red cells in 24 h), only 2 involved a MHP call. Of the 25 requests without an associated MHP call, 10 requested multiple different types of blood product. On 8 occasions, fewer blood products were transfused than initially requested.

Conclusion: By successfully linking all calls requiring blood products, we can analyse the timeliness of obtaining them at the bedside. We also identified a significant number of activations that did not require blood products. Finally, we expanded our proforma to include patients requiring major transfusions, even without MHP activation, in order to assess whether activation was clinically indicated. This data can identify specific teams facing a high number of major haemorrhages in order to provide targeted training. Moreover, data on the number of products used per patient, team members present, and timeliness of obtaining blood products can be used to improve MHP use and outcomes.

[1] Sihler KC, Napolitano LM. Complications of massive transfusion. Chest. 2010 Jan;137(1):209–20. doi: https://doi.org/10.1378/chest.09-0252. Erratum in: Chest. 2010 Mar;137(3):744. PMID: 20051407.

PO67 | Considering the uncertainty of measurement and trend analysis for true error detection—Supplementary trending of UK NEQAS Feto-maternal haemorrhage exercise data

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Red Cell Immunohaematology - NHS Blood and Transplant

Introduction: UK NEQAS Schemes are educational, allow inter-laboratory comparison and identify the overall UK performance. Unsatisfactory performance is used for service review through an organisation's quality management system. The UK NEQAS Feto-Maternal Haemorrhage (FMH) scheme reinforces national guidelines and continuous improvement. Exercises are released regularly, giving a snapshot of a laboratory's performance. Reports contain information related to an exercise, but attention is often focused on the accuracy of quantification score (AQS) (0–79 = satisfactory; 80–99 = borderline and ≥100 = Unsatisfactory). Changes, even minor variations that demonstrate less satisfactory scores, can result with a need to understand what this means for an FMH service. Here we use

supplementary trending to give a greater understanding of the relationship of UK NEQAS FMH exercise data to the Red Cell Immunohaematology (RCI) FMH service.

Method: Data was plotted chronologically (X axis) versus exercise bleed volume results (Y axis). Data points included each laboratory and the method median for the exercise. The Uncertainty of measurement (UoM) of the RCI FMH service was represented as a min/max error bar on the method median data point. Rules were created to allow the service to consider results generated:

- By multiple separate Biomedical Scientists
- From multiple separate exercises
- Across a broad time frame (minimum 6 months)
- By an odd number of data points

Rule 1—For any one NEQAS exercise sample, an RCI laboratory result (ml packed RBCs) falls outside of the anti-D method median ± the UoM (20%).

Rule 2—A trend of seven results (ml packed RBCs) from one RCI laboratory are consecutively above or below the anti-D method result.

Rules 1 and 2 exclude results removed from scoring; and rule 2 excludes results that break rule 1.

Results: AQS showed increases and decreases for each RCI laboratory. All results were within the satisfactory range. Rule 1 was broken in one exercise but resulted from of an input error. No laboratory was observed to break rule 2.

Conclusion: Variability was observed for the AQS, however, supplementary trending of data gave reassurance that the variability was related to the UoM in anti-D FMH flowcytometry investigation.

PO68 | Learning lessons from patterns of blood transfusion practice on a trauma & orthopaedic ward

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Introduction: The safe and effective use of blood transfusion products requires informed patient consent, good documentation, is fully traceable, and contains completed records that include indication codes and evidence of clinical need. A service evaluation audit was undertaken to assess the Blood Transfusion practice, the request procedure, appropriateness and its indications on the Trauma & Orthopaedic Ward at our Trust.

Methods: Data was collected retrospectively from electronic patient records (EPR) and Blood Transfusion records over a 1-year period (01/01/2020–29/12/2020). Standards were referenced from guidelines set by The Advisory Committee on the Safety of Blood, Tissue, and Organs (SaBTO)[1], British Society for Haematology[2], NICE[3] and the Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee (JPAC)[4]. Patient demographics, evidence of Informed patient consent, reason for transfusions, and appropriateness of documentation were analysed.

Results: A total of 92 patients were included in the audit. Mean age patients were 82 years. Eighty-seven patients received blood transfusion (Range 1–10 units) predominantly in patients undergoing operative hip fracture fixations. However, 6% of records showed no evidence of informed consent being obtained and 60% had no evidence of patients being provided with an information leaflet. There was a uniform lack of the use of Indication codes and 21% of transfusion requests did not have special requirements checked.

Conclusion: Although blood usage was generally restrictive, Blood Transfusion Documentation was poor. The need for better education around providing relevant clinical details, provision of information leaflets and informed consent amongst clinicians was highlighted. Enhanced training, education on providing patient information leaflets and introduction of Blood Assist app has been initiated to improve clinical practice.

PO69 | Blood transfusion laboratory staffing audit

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BLOOD TRANSFUSION LABORATORY STAFFING AUDIT BACKGROUND Concerns had been raised by staff in all 3 ICHNT blood transfusion laboratories (BT) over staffing shortages and resultant pressures on workload and adequate service provision. AIM To audit staffing levels in all three ICHNT BT laboratories against the agreed levels for service provision as set out in the Business Continuity/Contingency Plans for each laboratory. AUDIT STANDARDS Hammersmith Hospital (HH)—Business Continuity and Capacity Plan (BTS-MP-001-IMP) Charing Cross Hospital (CXH)—Haematology and Blood Transfusion Contingency Plan (HAE-LP-1504-X) St Mary's Hospital (SMH)—Blood Sciences Business Continuity Plan (BSC-LP-027-NWL) Staffing levels are coded as follows: GREEN—normal working levels AMBER—reduced working levels RED—critical working levels Business Continuity/Contingency Plans for each BT laboratory detailed the specific staff numbers and grades required to meet each working level (GREEN vs. AMBER vs. RED) as these differ across the three sites. AUDIT PERIOD Total audit period—6 months (27 weeks) Audit commenced on 2/8/21 (0900) and ended on 7/2/22 (0900) METHOD OF DATA COLLECTION Audit template collected daily from each lab detailing (1) daily staffing levels (2) Coded as GREEN/AMBER/RED according to each Business Continuity/Contingency Plan for each laboratory (3) Reason for staff shortage (4) data on impact of staff shortages on workload RESULTS Staffing levels: STAFFING LEVELS NUMBER OF DAYS RED 133 RED/AMBER 41 AMBER 117 AMBER/GREEN 14 GREEN 262 (171 were Sat/Sun/BH) CONCLUSION Over 6 months, staffing levels were sub-optimal (less than GREEN) over half the time (54%). Of the days where staffing levels were categorised as green, 171/262 (65%) were Sat/Sun/BH. Staffing levels are lower over weekends due to reduced workload. ■ HH—3 × BMS during the day +1 × BMS overnight ■ CXH—1 × BMS during the day +1 × BMS overnight ■ SMH—3 × BMS during the day +2 × BMS overnight Staffing levels were suboptimal when labs were at their busiest, that is, when providing routine as well as emergency services during weekdays.

DOI: 10.1111/tme.12917

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