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ABSTRACT

Poster Presentations

Theme: Blood donation (including donor safety)

PO1 | Donor deferral and common causes: A cross sectional study among prospective blood donors at the limbe regional hospital blood bank, Cameroon

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Background: The scarcity of blood donors has always been a major concern for blood banks globally. Lack of eligibility by potential blood donors to donate blood called blood donor deferral is associated with the unsustainable and inadequate amount of blood collected by blood banks worldwide. However, there is limited information on blood donor deferral rates and causes reported from the Limbe Regional Hospital blood bank. This study was aimed at determining the blood donor deferral rate and common causes at Limbe blood bank centre.

Methods: A hospital-based cross-sectional study that included blood donors was carried out that lasted from January 2021 to July 2021 at Limbe Regional Hospital's blood bank. Blood donors' data were collected using structured questionnaires, and donors were screened following the National Policy for blood donor selection criteria in Cameroon. Data were entered into Excel version 2013 and transferred to SPSS version 20 for analysis. The level of significance alpha of 5% at a 95% confidence interval was considered.

Results: The blood donor deferral rate was 13.6% and no association was observed between type of donor and donor acceptance status as well as between type of donor and deferral status (P value > 0.05). Hepatitis B surface antigen positive (66.7%), hypertension (22.2%), and diabetic (11.1%) were the causes of permanent deferrals whereas low haemoglobin concentration (71.4%), low weight (14.3%) and donation interval less than the specified periods (14.3%) were the causes of temporal deferrals.

Conclusion: The blood donor deferral rate is high at the Limbe Regional hospital blood bank and donor deferral is not dependent on the type of donor and also donor type does not influence the deferral status. HBsAg positive was the leading cause of permanent deferrals and low haemoglobin concentration was the leading cause of temporal deferrals. Communities should be educated on the criteria for blood donor selection. The blood transfusion service should be charged with the follow up of all deferred cases, management of permanent deferred cases and notification of regain of eligibility by temporal deferred cases.

PO2 | Coming of age: Cross-sectional study on awareness, willingness to advocate, and willingness to voluntarily donate blood among secondary school students in Nigeria

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Introduction: Low levels of awareness and numerous myths and misconceptions abound in Nigeria, challenging donor recruitment and retention for regular voluntary non-remunerated blood donation (VNRD). We aimed to study awareness, and willingness to advocate and voluntarily donate blood among students from 19 secondary schools in Nigeria's Federal Capital Territory (FCT).

Methods: A cross-sectional study to determine the knowledge, attitudes and practices regarding VNRD among 133 secondary school students in FCT. Data was analysed using Statistical Package for Social Sciences (SPSS) version 25.

Results: Majority of the students (71.5%) were ≥ 15 years, and 67.7% were female. Nearly all (98.5%) had heard of VNRD, and parents and healthcare providers accounted for 34.6%, and 31.6% of information, with internet, and radio/television accounting for only 12.3% and 2.3%. Up to 85.4% knew their blood groups, 96.9% regarded blood donation as a good practice but 42.3% believed it could cause illness. Ninety percent of students reported that they would encourage their family and friends to donate blood, and 80.8% said they would donate blood when old enough to do so. Students who deemed blood donation a good practice were 15 times more likely to encourage family or friends to donate blood (OR 15.226 CI 14.31–16.19). Also, those aged ≥18 years were five times more likely to be willing to donate blood themselves (OR 5.273; CI 1.100–25.274), and those who personally knew a regular blood donor were nearly four times more likely to be willing to donate blood (OR 3.850; CI 1.243–11.921). Conversely, students who perceived blood donation as a cause of illness were less likely to be willing to donate blood (OR 0.210; CI 0.071–0.623).

Discussion: Despite pervasive sociocultural myths and misconceptions surrounding VNRD, there is a high level of willingness to

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advocate and regularly donate blood among Nigerian secondary school students in the FCT. This study illustrates the importance of community role modelling for positive behavioural change and regular VNRD. It also highlights the importance of targeted public education on the benefits of blood donation and donor risk assessment to address misconceptions and increase numbers of VNRDs and address safe blood shortages.

PO3 | Directed allogeneic blood donations–What's the contemporary evidence and approach?

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Introduction: Directed blood donations are those where the donations are routed to specific designated recipient/s and are very rarely indicated. Allogenic blood transfusions are very safe in the UK (SHOT 2021 report). The logistics and scheduling of collections for designated donations is more difficult than for general allogeneic donations. While any blood component (red blood cells, plasma, cryoprecipitate, platelets or granulocytes) can be directed towards a particular patient, most directed donations are for red cells. Provision of directed donations in the rare scenarios where these may be indicated needs careful planning including logistics around collection and testing.

Methodology and Literature review

The writing group was convened with expertise from several NHSBT teams. The Information Specialist from the Systematic Review Initiative developed the search strategy and performed the search on 29 October 2021 for the period from the production of the previous review (1 January 2012). We searched the following databases for any studies that assessed the use of directed donation:

- MEDLINE (Ovid, 1946 to present)
- Embase (Ovid, 1974 to present)
- CINAHL (EBSCOHost, 1934 to present)
- Web of Science–Editions = BKCI-S, ESCI, CPCI-S, SCI-EXPANDED (Clarivate, 1990 to present)
- PubMed (NLM, for e-publications ahead or print only)

Results: The search identified 2454 citations, of which 622 were duplicates, and 1690 were discarded as irrelevant. We therefore reviewed 142 references at full text.

Conclusion: The ideal blood is from an allogeneic voluntary donor for a given patient, ABO and D compatible, K negative if the patient is a female of or below childbearing age and negative for any current or historically significant red cell antibodies.

Where appropriate if donor blood is not available, directed donations may be indicated in the provision of red cells of very rare phenotype for a patient with multiple antibodies or potential antibodies to high-incidence antigens.

In addition, in the provision of matched platelets for a patient refractory to random donor platelets or in the provision of maternal platelets in the very unlikely situation that platelets from a suitable unrelated donor cannot be provided in cases of Neonatal Alloimmune Thrombocytopenia.

PO4 | The transfusion medicine epidemiology review (TMER): 1997–2022

Ms Jan Mackenzie[1], Ms Claire Reynolds[2], Ms Tali Yawitch[2], Ms Autumn St John[2], Dr Heli Harvala[2], Professor Richard Knight[1]

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Background and Objectives: The Transfusion Medicine Epidemiology Review seeks evidence whether Creutzfeldt-Jakob disease (CJD) may be transmissible via blood components.

Materials and methods: Sporadic CJD (sCJD) and genetic CJD (gCJD) cases are notified to the national blood services retrospectively and all variant CJD (vCJD) cases aged 17 and above are notified at diagnosis. A search is made for donation records and the usage of donations is determined by look-back. For cases with a history of blood transfusion, hospital/UK Blood Services records are examined to identify donors. Details of identified recipients/donors are cross-checked against the NCJDRSU database to identify any matches and death certificates are reviewed on individuals who have died to check cause(s) of death are not CJD/vCJD related.

Results: A total of 1161 sCJD and 52 gCJD cases had their donation status checked. Of these, 591 sCJD and 41 gCJD cases were reported to be blood donors by surrogate witnesses. A further 35 sCJD cases who were not reported to have been blood donors were registered as donors. Seventy-one sCJD and 5 gCJD donors had donations issued for clinical usage which were traced to 586 and 31 recipients respectively. Twelve of these recipients (9 from sCJD and 3 from gCJD donors) were reported to have died with, or of, dementia, but these were not believed to be cases of CJD. The study also traced records of 34 sCJD cases from 198 who were reported to have received a blood transfusion after 1980. These 34 sCJD cases received blood components originating from 310 donors. One donor died from dementia, but this was not believed to be CJD.

The vCJD arm found 18 vCJD blood donors with donations issued for clinical usage and traced to 67 recipients. Three cases of vCJD and one other recipient with post mortem confirmation of abnormal prion protein deposition in the spleen have previously been reported[1,2]. Ten vCJD cases were identified as blood recipients[3]; three of these are the cases described above.

Conclusions: No new cases of transfusion associated vCJD have been identified and no evidence of transfusion transmission of sporadic or genetic subtypes of CJD.

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PO5 | Incentivised methods towards the retention of blood donors in Nigeria

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Background: There has been growing inadequacy of voluntary blood donors in Nigeria, resulting in inadequate availability and supply of safe blood and blood products in blood banks and hospitals.
Aim: To determine the factors that promote voluntary blood donor retention among the Nigerian population.
Method: A cross-sectional study was performed using an electronically transmitted survey. The respondents were individuals aged 18 years and above who have donated blood at least once in their lifetime. Quantitative data such as gender, age range, number of previous donations, and factors that motivate and discourage blood donation were collated and analysed.
Result: The respondents were 53.8% male and 49.2% female, mostly between 26 and 40 years old and from diverse ethnoreligious backgrounds spread across Nigeria. The majority of respondents opined that the need to help others was their greatest motivation to become first-time donors. When asked about the motivations for regular blood donation, the majority of the respondents (47.5%) stated that regular calls and reminders were the main motivation. Similarly, most respondents claimed to have had a positive experience during previous donations, however, they highlighted that time constraints and busy schedules were the two main factors that prevented them from donating more frequently.
Discussion and Conclusion: Retaining voluntary blood donors in Nigeria has been a herculean task for government-managed blood transfusion agencies, hospitals and non-profits in the space. Our study reveals that regular communication must be established with first-time and recurrent voluntary blood donors to maintain their continued commitment to saving lives. However, regular phone calls, text messages and emails that have been found to be beneficial in retaining voluntary blood donors require adequate coordination, designated personnel and funds to execute. Hence, blood collection agencies and blood donation charities must be supported with funds and other resources for effective communication with new and existing blood donors.
Keywords: Blood, Donor, Voluntary, Database, Transfusion

PO6 | NHS blood & transplant (NHSBT) blood supply clinical complaints and compliments–Shared learning

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Background: Shared learning from complaints and compliments is an important element of service improvement. In March 2022, a 'Clinical Complaints and Compliments' (CCC) sub-group of the NHSBT Blood Supply Clinical Audit, Risk and Effectiveness Committee was formed to look at clinical complaints and compliments data, to identify and examine key themes, provide assurance and produce insights and recommendations to help improve service to donors.
Methods: Complaints/compliments received from blood donors are managed by NHSBT's Donor Feedback Team and are categorised according to key themes. Whilst many complaints are 'operational' in nature (e.g., related to appointments), some have 'clinical' implications. The CCC group carried out 'deep dives' for each clinical category.
Results: 21 complaint/compliment categories were identified as having clinical implications, including screening/deferral, Donation Safety Check (DSC), venepuncture, Hb test, equipment/dressings and donor eligibility polices. Clinically related complaints account for a monthly average of ~15% of total blood donor complaints. Within its first reporting year, all clinically related complaint/compliment categories have been reviewed-a total of 852 complaints and 101 compliments.
Key Themes/Recommendations
Across the various clinical complaint/compliment categories, a number of key themes have emerged:

- All resources/sources of information available to donors need to be clear and consistent, with a focus on: (1) pre-donation food/drink intake (2) not accepting donors who are waiting for tests/investigations/results and (3) information for donors who are deferred/suspended.
- Donors should be provided with more information about: (1) venepuncture policy and (2) Hb test – with a review of the donor information leaflets 'Arm Care' and 'Low haemoglobin and iron' recommended.

Key findings/recommendations are being shared to support:

- Internal projects looking at Hb screening and blood donation session flow
- A review of the DSC, Donor Consent Booklet and the blood.co.uk website
- Operational improvements and learning across the blood supply chain

Conclusions/Next steps
The shared learning from these deep dives have helped to develop donor insights and identify/further advance service improvements.
A second round of deep dive reviews is in progress to continue to inform shared learning, identify any changes and consider the likely impact of the recommendations so far.

PO7 | "Evaluation of the architect Chagas antibody screening assay: Qualifying Brazilian nationalities for donation in Ireland"

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Background: Chagas Disease (CD) currently affects over 6 million people globally[1]. Once endemic in Latin American (LA), CD now affects countries in Europe and North America. As a result, the Commission Directive 2004/33/EC for the EU imposed the deferral of blood donors with active or past CD infection. Several European countries have since implemented CD screening in pre-transfusion donor testing. Ireland, home to nearly 30,000 Brazilian nationals[2], currently defers LA donors due to CD risk, despite the increasing need for ethnically diverse donors.

Methods: The Chagas antibody assay (Abbott Diagnostics) was evaluated on the Architect i2000SR in the Virology department in the Irish Blood Transfusion Services (IBTS); parameters that were evaluated included repeatability, intra-assay reproducibility, cross-contamination and turnaround time. WHO reference standards, 09/186 and 09/188 were used to assess analytical sensitivity. An estimation of Brazilian and Irish phenotype differences was performed by literature research.

Results: Analytical sensitivity of the assay was 1/64 for WHO standard 09/188 and 1/32 for standard 09/186. Repeatability and reproducibility of the assay gave a coefficient of variation (CV) of 1.6% and 2.8% respectively. No cross-contamination was observed. Research has demonstrated Brazilian donors appear to exhibit comparable ABO and Rh phenotypes to Irish donors, with higher group A (34% vs. 30%), R0r (6.3% vs. 1.4%) and rr (19% vs. 16.7%) phenotype prevalence.

Conclusions: The assay meets all parameters set by the IBTS for this evaluation, however diagnostic sensitivity and specificity studies are required before the implementation of Chagas screening and a review of other deferrals for Brazilians is needed. Chagas screening in Ireland would facilitate the recruitment of ethnically diverse donors, and therefore help maintain the blood supply for those with complex phenotypes.

PO8 | Carbon footprint of red blood cell transfusion: The journey from donor to recipient

Aaliyah Sharif Abdalla Sharif Abdalla[1], PhD FRCPath Stephen Thomas[1], Charlotte Andrews[2], Nikhil Agarwal[2], Sylvia Eskander[2], Dr Stephen Hibbs[3], Professor Mike Murphy[4], Julie Staves[4], Matthew Eckelman[2]

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Introduction: The NHS is estimated to account for 4% of UK CO_2 emissions and aims to reach net zero by 2040. Over 2 million blood components are issued by UK blood services each year, providing life-saving transfusions for patients in hospitals. A review of the blood supply chain determined the carbon footprint of each standard red cell concentrate (RCC) supplied and identified opportunities to make significant reductions in CO_2 emissions.

Methods: This lifecycle analysis considered the path from the donation of whole blood (WB) to the transfusion of a standard RCC, incorporating transportation of the donor, the WB donation and the RCC, and the testing, manufacturing, stockholding and hospital transfusion activities. Primary data included the energy use of machinery; consumables used, and transport information for donors and deliveries. Secondary data included carbon content estimates for UK electricity and carbon emissions from transportation. Delivery and disposal of consumables and the construction and supply of machinery and other infrastructure were excluded from the scope.

Results: Each unit of RCC transfused is estimated to generate 9.25 kg CO2eq (Table 1). Hospital transfusion (primarily refrigeration) and transportation were the major contributors to this total. Further refinement is in progress for the transfusion refrigeration footprint, as consumption estimates were used in the calculations, which were based on one hospital trust and extrapolated.

Table 1 – Carbon footprint of each sub-process in the RCC supply chain

Sub-process	CO_2 eq/unit (kg)	Proportion (%)
Transportation	2.86	31
Donation	1.57	17
Testing	0.33	4
Manufacturing	0.60	6
Stockholding	0.09	1
Hospital transfusion	3.80	41
Total	9.25	100

Conclusion: The largest contribution to the current footprint appears to from the use of many refrigerators located at multiple points of use in hospitals. More efficient refrigeration and transport strategies would be the most likely sub-processes to yield a reduction in carbon footprint. Renewable energy sources could lower the carbon emissions by ~13%, reducing the estimated overall total emission from 9.2 kg CO_2 eq to under 8 kg CO_2 eq. This model can be adapted to consider other blood components such as Fresh Frozen Plasma and Platelet Concentrates.

PO9 | Understanding donor adverse events: Developing a new adverse event dashboard

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Blood donation is generally a safe procedure, but donors can experience adverse events, such as faints, bruising or arm pain. Recording donor adverse events (DAEs) is a regulatory requirement for blood transfusion services. As well as providing a record for individual donors, this allows services to monitor DAE rates and develop strategies to reduce these if possible. Accurate DAE data also supports effective donor consent.

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SNBTS registers DAEs in eProgesa, our donor / donation database, using standard comments. These are entered with the date of the associated donation event, even if the DAE is only identified in retrospect. DAE data is available through Account for Donation (AfD), a data mart based on daily data loads from eProgesa. The DAE data is then linked to donation activity data to present DAE rates per 1000 attendances and presented to users via a Tableau dashboard. Tableau dashboards present data through visualisations and user interactions to support service intelligence and improvement initiatives.

Recently we have developed the Adverse Events–5 year annual trend dashboard, focussing on longer-term trends in DAE rates and the impact of demographic factors on these. This will allow SNBTS Donor Services to:

- Identify trends in DAE rates over a longer time period.
- Develop DAE-reduction strategies targeted at the highest risk donors.
- Monitor the impact of changes in procedures, including DAE-reduction measures.

Users can interact with the 5-year dashboard to access data specific to individual adverse event categories or demographic groups. For example, by extracting data from the dashboard, SNBTS trends for vasovagal reactions can be demonstrated. These include:

- The impact of demographic factors (age and sex) on the risk of immediate vasovagal reactions, including an increased risk in younger donors of both sexes.
- The contrasting demographic risk profile for delayed vasovagal reactions, with risk increased in younger (17–24) or older (>55) female donors.
- A sustained fall in vasovagal rates for whole blood donors following the implementation of strengthened faint reduction measures from 2018.

This data will support work to develop and refine faint reduction measures aimed specifically at those donors most at risk.

Theme: Components, donation testing and safety, tissues, cells and cellular therapies

PO10 | Effect of mixing on the quality of red cells at time expiry

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Introduction: Studies have suggested regular mixing of red cell concentrates influences the in vitro quality of stored red cells. In particular, haemolysis is reported to be lower in units that are regularly mixed over the course of storage. Commercial red cell storage bags are predominantly made of polyvinyl chloride (PVC) plasticized with di(2-ethylhexyl) phthalate (DEHP). Historically, removal of DEHP from blood bags has been linked to haemolysis levels that exceed recommended guidelines. Expected regulatory restrictions on DEHP use due to toxicity concerns increase the urgency to replace DEHP without compromising component quality or reducing shelf life. Alternative plasticisers and additive solutions are being considered. Regular mixing of units is a conceptually simple approach that could also help to improve red cell quality. This study investigates how regular mixing affects haemolysis and extracellular potassium levels in current packs containing DEHP and SAG-M additive solution.

Methods: For each replicate, two leucodepleted red cell units of the same ABO group and pack type were pooled and tested on day 1 to establish baseline levels of haemolysis and potassium. The units were re-split and randomly assigned to the test or control arm. Test units were mixed weekly whilst control units were stored without mixing. All units were stored at 2–6°C and tested again on day 36/37. Twenty replicates were measured: ten from bottom-and-top (BAT) and ten from top-and-top (TAT) packs.

Results: Mixed units had lower levels of haemolysis on day 36/37 (0.21% ± 0.13% vs. 0.32% ± 0.17% ($p < 0.001$)) but higher levels of extracellular potassium (43.9 ± 1.6 mmol/L versus 41.6 ± 1.2 mmol/L ($p < 0.001$)). All units in the test arm met the UK specification for end of shelf-life haemolysis (<0.8%) whilst one of the BAT control units failed to meet the specification.

Conclusions: Periodic mixing of red cell units reduced haemolysis at end of storage. There was an increase in extracellular potassium, though it is unclear if the statistically significant result would translate to clinical significance. Mixing red cell units during storage is a simple concept that may reduce haemolysis caused by the removal of DEHP from blood packs.

PO11 | Transfusion reactions–Are we doing enough?

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Introduction: Life threatening transfusion reactions can be prevented by a strict haemovigilance. The objective was to study the pattern of acute transfusion reactions in a tertiary care hospital in Southern India and intervene wherever necessary

Methods: Analysis of acute transfusion reactions during and until 24 h of transfusion reported in 266,924 blood components including Packed Red Blood Cells (PRBC), Random Donor Platelets (RDP) Fresh Frozen Plasma (FFP) and Single Donor Platelets (SDP) between 2010 and 2022 was done. Reactions were classified according to standard definitions of the ISBT working party on Haemovigilance (2011). Pre-storage leukoreduction by buffy coat depletion and inline filter bags (TERUMO BCT, Macopharma) were introduced in 2014 and 2017 respectively. Reactions were grouped as group I and II before and after introducing the buffy coat depletion respectively and as group III after introducing inline filter bags. Reactions were expressed as a percentage of each component and according to reaction type. SPSS windows version 24.0 (IBM corporation, USA 2016) using $p = 0.05$ as the level of statistical significance was used.

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Results A total of 357 reactions were observed in 266,924 (0.134%) transfusions A) Reaction according to the type 263 (0.098%), 63 (0.023%), 16 (0.005%), 8 (0.003%), 4 (0.001%), 3 (0.001%) patients had allergic, FNHTR, TACO, TAD, TRALI, TAH respectively.

Group 1 98/89,575 (0.11%) Allergic: 57, FNHTR 32, TACO 3, TAD 3, TRALI 2, TAH 1.

GROUP II 38/64,170 (0.06%) Allergic 20, FNHTR 13, TACO 3, TAD 2.

Group III 221 /113,179 (0.19%) Allergic 186, FNHTR 18, TACO 10, TAD 3, TRALI 2, TAH 2.

A statistically significant reduction of total reactions ($p = 0.001$) was seen between group I and II, but an increase in the incidence of TACO was observed in Groups I, II, and III respectively as follows 3 (0.003%), 3 (0.004%), 10 (0.008%).

(B) Reactions according to Component type:

PRBC 170/123,286 (0.14%), RDP 98/69,651 (0.14%), FFP 40/62,512 (0.06%), SDP 49/11,475 (0.42%)

PRBC:

Group I 60/45,469 (0.13%) Group II 27/28,662 (0.09%) GROUP III 83/49,155 (0.17%) with a statistically significant reduction ($p < 0.001$) between Groups I and II.

RDP:

Total reactions

Group I 21/23,234 (0.090%) II 5/18,062 (0.02) III 72/28,355 (0.25%).

A statistically significant reduction ($p = 0.05$) was seen between Groups I and II.

Conclusion Acute transfusions in our patient population was 0.134%. Although a decreasing trend in the total reactions was observed, other preventable reactions like TACO have shown an increase for which intervention by way of awareness and education would be necessary.

PO12 | Genetic background of wright blood groups among blood donors in Saudi Arabia

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Introduction: Thalassemia and sickle cell disease (SCD) are prevalent inherited blood disorders in southwestern Saudi Arabia. These patients require multiple blood transfusion units. Accordingly, alloimmunization might occur if donors and recipients are incompatible. To assure blood safety, patients need extensive matching of several blood group antigens. It is essential to examine various blood group antigens to provide well-matched blood units. Two alleles of the Diego (DI) blood group system, DI*02.03 and DI*02.04 encode the Wright antigens DI: 3, −4 or Wr (a + b−) and DI: −3, 4 or Wr (a − b+), respectively. Wr (a + b−) Antibodies can cause immediate/delayed haemolytic transfusion reactions and mild to severe haemolytic disease of the fetus and newborn. This study aimed to investigate the allele frequencies and genotypes prevalence of the Wright blood groups in southwestern Saudi Arabian blood donors.

Methods: A single nucleotide variation (SNV) c.1972G>A in exon 16 on the SLC4A1 gene distinguishes the Wr (a + b−) antigen from the Wr (a − b+) antigen, resulting in the amino acid substitution p.Glu658Lys. One-hundred-fifty samples were collected from voluntarily Saudi Arabian blood donors who live in Jazan Province. DNA extraction was conducted to the blood and sequence-specific primers were designed to amplify the SNV region (rs75731670) encoding the Wright alleles, DI*02.03 and DI*02.04. The resulting PCR products were purified and underwent standard sequencing.

Results: Of the 150 genotyped blood samples, the allele frequency of DI*02.04 was ($n = 150$, 100%), whereas the DI*02.03 allele was not observed. Accordingly, the genotype prevalence of DI*02.04/DI*02.04 was accounted for ($n = 150$, 100%). On the other hand, there were no observations for the heterozygous genotype DI*02.03/DI*02.04 as well as the homozygous genotype DI*02.03/DI*02.03.

Conclusion: This study demonstrated the allele frequencies of the DI*02.03 and DI*02.04 of the DI blood group system in Saudi Arabian blood donors. The DI*02.04 allele was observed in the entire population. Furthermore, the prevalence of the genotypes was determined, in which the only observed genotype was DI*02.04/DI*02.04. To provide better transfusion practices, especially for SCD and thalassemia patients, it is strongly advised to investigate the diverse alleles among the different blood group systems in the southwestern Saudi Arabian population.

PO13 | UK-sourced immunoglobulin: Surveillance for asymptomatic carriage of abnormal prion protein in primary immunodeficiency patients exposed between 1996 and 2000

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Background: Variant Creutzfeldt-Jakob disease (vCJD) is associated with an abnormal form of prion protein. Most cases have been attributed to eating bovine-spongiform-encephalopathy (BSE) contaminated meat products. However, secondary transmission has occurred through blood transfusion. Between 1996 and 2000, two intravenous immunoglobulin-products used to treat primary immunodeficiency diseases (PID) patients were manufactured from UK donor plasma, nine of whom subsequently developed vCJD. This study follows-up patients exposed to these treatments to identify any case of vCJD, if found, assess the likelihood of infection through this specific exposure.

Methods: The study began in 2006 and is ongoing. Consenting patients had annual telephone and biennial face-to-face follow-up. Medical records were reviewed, including to identify suitable-tissue samples for analysis. Blood samples were taken, anonymised and sent

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to the National Institute for Biological Standards and Control for storage pending possible future prion testing. PRNP-Codon 129 genotyping, histopathology, immunohistochemistry and PET-blot analysis were undertaken. All cases are followed up to death or withdrawal.

Results: 79 patients are included, none has yet shown symptoms or pathological evidence of vCJD. 58% were male, 70% born between 1960 and 1979, and 60% are still alive. The majority had a PID diagnosis of Common Variable Immunodeficiency (71%), and MM genotype (46%). The median time from first potential exposure to censor-date was 22.8 years (range 8.9–28.2 years), collectively contributing 1676 person-years of observation following their first exposure. Eight were known to have been treated with implicated batches. 46 patients donated 237 tissue specimens. 7 of the 21 individuals who died underwent autopsy-examination.

Conclusion: We found no clinical/pathological evidence of abnormal-prion-protein in these PID-patients. This is reassuring; however, the potential incubation period from a potentially low dose exposure may be long. Uncertainties remain concerning the number of asymptomatic vCJD infections in the UK population, the risk of infection via blood components or plasma-products derived from such individuals. The small number of vCJD cases, confirmed blood transmissions, and the absence of any vCJD cases in this study is reassuring, and is evidence to support UK plasma being used in plasma product production. However continued surveillance for vCJD, and follow-up of these patients is important for informing wider public health policy.

PO14 | The development of a novel ×3 buffy coat derived pooled platelet component through data modelling of current manufacturing processes

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Introduction: At the Welsh Blood Service (WBS), buffy coat-derived platelet concentrates (PCs) are manufactured by pooling four buffy coats in a suspension of approximately 65:35 PAS-E to plasma ratio. Platelets are separated using the CompoMat® G5+ (Fresenius Kabi). The current settings consistently produce mean platelet yields of approximately 355 × 109/unit. With European Blood Alliance grant funding, WBS aim to establish the optimal PC separation settings for the manufacture of PC using only three buffy coats and determine if a final component, meeting both UK (>240 × 109/unit) and European (>200 × 109/unit) specifications, can be routinely produced. The first stage involves modelling the platelet yields that PCs using three buffy coats would provide using the existing settings.

Methods: 164 buffy coats were manufactured into 41 PC. All buffy coats, buffy coat remnants and PCs were weighed to calculate unit volume, and tested for haematocrit and platelet concentration. The percentage platelet recovery for each PC was calculated as: (PC Platelet Yield/(PC Platelet Yield + Platelet Yield in Pooled Buffy Coat Remnant)) × 100). From these results a mean (average), minimum (worst) and maximum (best) percentage platelet recovery value was obtained to create model scenarios. For each PC there were four possible iterations of 3-buffy coat pooled remnants. The three calculated platelet recovery model scenarios were applied to each of the 164 3-buffy coat pooled iterations to calculate the percentage of PCs that would theoretically meet UK and European specifications.

RESULTS: Against the UK specification, the mean percentage recovery resulted in 75.6% of three-buffy coat PCs complying with the specification. Although only 54.6% complied using the worst-case scenario, none fell below the UK discard limit of <160 × 109/unit. Against the European specification, 98.2% three-buffy coat PCs in the mean percentage recovery scenario met the specification, decreasing to 94.5% in the worst-case scenario.

Discussion: Initial modelling suggests the current process at WBS would allow the manufacture of PCs from three buffy coats with high-level compliance against the European specification. Achieving UK specification requires further investigation. The next stage involves the manufacture of PC using three randomly selected buffy coats; testing various settings on the Compomat® G5+ to improve yields.

PO15 | Extracellular vesicles: A key consideration for future studies

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Introduction: Extracellular vesicles (EVs) are submicron particles enclosed in a phospholipid bilayer, released by all cell types, and are heavily involved in cell-to-cell communication. EVs are found in all biological fluids, including platelet concentrates (PCs). Evidence suggests that EVs produced by platelets are highly pro-coagulant and potentially pro-inflammatory, however are not considered in many transfusion-based studies. Many of these studies have utilised flow cytometry to determine EV concentration, which has been shown to under-report EV concentration. This study uses the gold standard methodology of EV counting, nanoparticle tracking analysis, to determine EV size and concentration in healthy individuals compared to fresh PCs to determine the effect of processing on EVs.

Methods: Fresh whole blood ($n = 20$) or day 2 buffy-coat derived PCs ($n = 6$) were used in the current study. EVs were isolated by size exclusion chromatography as recommended by the International Society of EV Guidelines. EV concentration was determined by nanoparticle tracking analysis (Nanosight, Malvern panalytical), the gold standard method for EV concentration and size analysis.

Results: EV concentration was not significantly different; however, EV size was significantly smaller in PCs compared to WB ($p = 0.01$).

Discussion: The suggested reason as to why EVs did not increase in PCs compared to fresh whole blood possibly was due to the loss of 70% plasma in buffy coat derived PCs. Results show that due to the size reported, around 40% of EVs would be "missed" when measured

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on flow cytometry due to resolution issues. This study shows the importance of using nanoparticle tracking analysis for EV concentration and characterisation. EVs derived from platelets are smaller and known to be more pro-coagulant and may cause a more pro-coagulant phenotype. This may benefit trauma patients but could produce prothrombotic complications in other patient groups. EVs should be a key consideration in future studies, especially when designing new components or altering storage conditions.

PO16 | Hematopoietic progenitor cell enumeration of cord blood donation with an anomalous CD34+ population

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Background: Cord blood units are a source of hematopoietic progenitor cells (HPC) used in transplantation to treat malignant and non-malignant conditions. CD34+ enumeration is performed on all cord blood units using flow cytometry. The CD34+ count is part of the unit profile visible on the stem cell registries. The unit in this case study, Donation α, presented an anomalous CD34+ population obscuring to the HPC cluster expected, preventing standard HPC enumeration for quality release. The purpose of this work was to define the cells lineage, accurately quantify the HPCs present and assess clinical significance.

Methods: A differential blood count and blood film was prepared from the cord blood sample, obtained at donation, and reviewed by a paediatric haematologist. After processing and cryogenic storage, a contiguous line segment was thawed, the sample was analysed using flow cytometry for CD34+-FITC/CD117+-PE markers. CD117 is seen on granulocyte and myeloid lineage precursors which may not be CD34+(1). CD117 may assist in identifying the true HPC population. A control unit, donation β, was tested on the normal QC (CD45+/CD34+) protocol and a CD117 protocol. By matching the HPC scatter and fluorescence patterns of donation β an alternative method of HPC cells was validated. This was then applied to donation α to enumerate the HPC Cells.

Results: The full blood count and blood film completed on cord sample at the point of donation were within clinical ranges. The control unit CD117 panel had HPC results within 20% of the standard QC. Donation α HPC results were >50% different between the panels with CD34+ over expression is seen in a range of lineages, based on scatter pattern.

Conclusions: The use of a CD117/CD34 panel provides an alternative enumeration pathway when reporting HPC counts for cord blood units. Further work would be required to identify the cause of the contaminating population, however this and any future units with this flow cytometry pattern would be excluded from clinical use. The clinical implications are monitored through the clinical feedback pathway, out of specification results are reported to clinicians responsible for mother and baby who may initiate additional blood work.

PO17 | Save plasma: Use sample taken from segment instead of unit for routine quality control testing

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Introduction: Every year, approximately 0.75 million plasma units are estimated to be discarded as part of routine quality control (QC) testing (∼1% of plasma components prepared) in our country. QC testing requires thawing of the plasma unit for obtaining a representative sample and the unit is discarded as it is opened, thawed and cannot be used for transfusion. This study was done to assess if sample taken from segments instead of plasma units can be used for QC testing.

Methods: This was a prospective observational study done on Fresh frozen plasma (FFP) ($n = 35$) prepared from 450 mL whole blood collected from known O RhD-positive male donors. Longer segments (∼10 cm) were prepared and separated from FFP at the time of component preparation. Both, the segment and the plasma units were frozen and stored together at ≤40°C as per departmental SOP. Prothrombin Time (PT), Activated thromboplastin time (APTT), FV, FVII, FVIII and fibrinogen levels were estimated using automated coagulation analyser (STA Satellite, Diagnostica Stago). Segment and bag values were compared (Wilcoxan Signed Ranks Test) to assess significant differences. Simple linear regression was used to derive a mathematical equation for variables with significant differences.

Results: Of the coagulation factors assessed, PT (mean 14.6 vs. 14.2 s), FVII activity (145% vs. 161.2%) and Fibrinogen levels (305.7 vs. 301.9 mg/dL) were comparable in both groups. While, significant differences were observed in mean APTT (29.7 vs. 30.7 s, $p = 0.04$) and, mean FVIII activity (216.2% vs. 172.6%, $p = 0.006$) and mean FV activity (132.3% vs. 104.4%, $p = 0.047$) between the segment and bag plasma samples. Mathematical equation for estimation of bag values from the segment values could be derived for APTT and Factor VIII but not for Factor V.

Discussion: Instead of bag sample, sample taken from segment can be used for testing the parameters of routine quality control by considering the test values obtained from samples as it is or through the use of mathematical equation. This can help prevent wastage of precious plasma units.

PO18 | Finding the unicorn units. A truly collaborative NHSBT approach

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Introduction: This abstract describes the application of exceptional teamwork and interdepartmental collaboration at NHSBT to provide a continuous supply of extremely rare units for intrauterine transfusion (IUT).

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Background: May 2023: RCI Colindale identified anti-D (increased from 28.7 IU/mL 2 weeks previously, to 197.1 IU/mL) + C (titre 128) + Fyb (neat) + s (historical) in a 28 weeks' pregnant woman. She was transferred to a tertiary Hospital for urgent IUT, meaning RCI Tooting handled subsequent RCI referrals. As no suitable units were available nationally, a D-C-Fyb- but s heterozygous large volume transfusion (LVT) unit in SAGM instead of plasma reduced was manufactured for IUT under concession. Pre-IUT fetal Hb: 40 g/L; 80 mL was transfused but some lost into pericardial tamponade, rendering timing of the next IUT uncertain.

Given the rarity of suitable blood (~1 in 5000), a plan was implemented to hold rolling stock of 1, 2 Group O, D-, C-, Fyb-, s- CMV- <5 days old, HbS-, HT neg, plasma reduced, units until 4 days post-delivery,

1 week later, a further IUT was required with 24 h notice. NHSBT provided a unit matching all specifications. Pre-IUT fetal Hb: 94 g/L; 60 mL transfused; post-IUT Hb: 147 g/L.

Plan

- All units potentially suitable for neonatal transfusion were Fyb and s typed.
- Suitable units were held at Colindale Hospital Services (HS) for manufacture into IUT / exchange units when required (shelf life is <5 days).
- Close collaboration between the national donation testing sites (Filton and Manchester) and the national manufacturing sites (Colindale and Manchester) ensured unsuitable units were redeployed to avoid waste.
- Colindale HS ensured optimal availability of 1, 2 units and updated stakeholders as to status. If none were available, less optimal units were held for concessionary release by a consultant.
- When required, Colindale HS coordinated manufacture of units, and transport to Tooting for dispatch to the Hospital.
- The RCI Consultant and Fetal Medicine Consultant liaised to best predict timing of the next IUT

Conclusion: We have provided units for 2 successful IUTs and continue to support the ongoing pregnancy, thanks to the amazing collaboration of all involved.

PO19 | Evaluation of hepatitis A virus and parvovirus B19 molecular screening assays to support the plasma for medicines programme in NHS blood and transplant

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Background: Human parvovirus B19 (B19) and hepatitis A (HAV) are both non-enveloped ssDNA and ssRNA viruses transmissible through blood components and plasma-derived products. B19 high-titre replication may result in aplastic crisis, while HAV can aggravate hepatitis. The European Medical Agency recommends that all plasma products intended for medicinal use include high titre B19 and HAV screening to reduce transfusion transmitted infections. There are several laboratory analytic assays to detect B19 and HAV in samples; however Nucleic Acid Testing (NAT) has evidenced its critical significance in early viral detection.

NHS Blood and Transplant (NHSBT) has started to collect plasma donations to support long-term domestic supply of plasma in England. Stored plasma will be manufactured into medicine by a fractionator which is due to be appointed.

Aim: To support the introduction of HAV/B19 screening of English plasma donors, NHSBT is concluding an evaluation of the Grifols Procleix Parvo/HAV and Roche Cobas DPX (B19/HAV) NAT assays.

Method: The evaluation includes but is not limited to specificity, sensitivity, repeatability and reproducibility to determine the clinical and analytical performance of the assays. To assess assay specificity, 2200 anonymised first time blood donor samples were used. Sensitivity was assessed using clinical positive samples and commercial panels. Various serial dilutions ranging from 0 to 1500 IU/mL of spiked HAV or B19 were prepared to determine the limit of detection. Data analysis using quality control and positive material was performed to determine the Coefficient Variation (CV) of grouped data.

Results: Initial analysis showed all assays passed the NHSBT evaluation criteria. The clinical sensitivity and specificity are ≥99.5%. CV for repeatability and reproducibility is <15%. Analysis is ongoing for limit of detection.

Conclusion: It is a "Red Book"1 requirement that all assays used for donation screening are assessed in respect of sensitivity and specificity and deemed suitable by the relevant UK Blood Establishment. Data analysis to date indicates that the two assays under evaluation are acceptable; however, the evaluation will be concluded in June 2023 and presented for formal approval prior to implementation of HAV/B19 testing within NHSBT.

PO20 | Beyond the DEHP sunset to PVC-free blood bags: The future blood bags initiative

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Current blood bags are manufactured from PVC plasticised with di-2-(ethylhexyl)-phthalate (DEHP). Concerns have been raised regarding endocrine disrupting and environmental effects of DEHP. These have led to the EU phasing out DEHP with a sunset date of 27 May 2025. Alternatives to DEHP are available but require validation. An EBA project has described a community-wide approach to reduce the burden of validation (1).

EU REACH regulations are undergoing a transformation with the proposed introduction of the Restrictions Roadmap (2). This ambitious project proposes categorising chemicals into pools for restriction. Pool 1 contains the entry "PVC and its additives". On the face of it, the restrictions roadmap proposes the elimination of PVC in

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the EU. Restrictions on the use of PVC reflect environmental challenges during manufacture and disposal. The proposal has not been adopted and exemptions would likely be possible.

The combination of DEHP sunset, new MDRs and the proposed restrictions roadmap pose major challenges to blood establishments.

What alternatives to PVC are possible for blood bags? Polyolefin blood bags have been developed, but these are inferior in comparison to PVC (3, 4). Limitations include physical properties (e.g., welding, temperature sensitivity) and biocompatibility, for example, a shorter red blood cell storage time. A PVC-free blood bags project was funded by the EU but has completed without a successful commercial product (5).

Recently, a research group has described an alternative plastic with comparable properties to PVC (6). The biocompatibility of this material is unknown, but it establishes the principle of a viable alternative to PVC.

The timeline from development to deployment of a PVC-alternative is lengthy. A do-nothing scenario in the face of potential regulation could lead to serious supply challenges in the near future. Consequently, NHSBT is exploring an innovation partnership to develop the blood bags of the future. Two partners have been engaged and options are being explored to develop this initiative. The partners are evaluating potential materials for a two-phase project rollout.

PO21 | Beckman coulter PK7400 primary blood group analyser is suitable for phenotyping and screening Irish blood donors

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Introduction: The Beckman Coulter PK7400 blood group typing system uses microplate technology to perform phenotypes on blood donors within the ABO, Rhesus and Kell blood group systems, high titre (HT) anti-A/B and irregular antibody screens. The significant differences from the PK7300 system are that the PK7400 is a closed IVDR compliant system, and has an improved user software interface. The aim of this project was to validate the performance of the PK7400 in comparison to the currently in-use PK7300 system, and if acceptable, bring into routine use to type Irish blood donors.

Method: In excess of 18,000 EDTA samples were tested in parallel on the PK7400 and PK7300 systems with reference to sample sensitivity, specificity, reproducibility, repeatability and throughput. ABO, RhD, RhCE, and K phenotypes were determined using two different Diagast antisera which detect the presence or absence of specific antigens on the surface of red blood cells. A donor antibody screen was performed using 3-cell SNBTS Paganised panel, and group A1, B cells used to detect HT anti-A/B. Whole blood, antibody and monoclonal controls were used to qualify the run. Ortho Vision technology was used to resolve discrepant antibody screen results.

Results: There was 100% phenotyping concordance of results between the PK7400 and PK7300, with the exception of the Ax phenotype where Diagast anti-A, B (PK2) did not detect all examples of this ABO subtype. This remains an open issue with the supplier.

There was an initially high rate of reverse group discordance. Following a change in reverse group diluent from Bromelain to physiological saline this was significantly reduced to an acceptable discordance rate.

Cross contamination was observed between testing profiles. This issue was eliminated following the introduction of an enhanced wash step.

An acceptable discordance was observed between PK7400 and PK7300 donor antibody screen results, which resolved in favour of the PK7400 analyser.

There was an acceptable discordance between PK7400 and PK7300 HT results.

Discussion: The PK7400 has been implemented successfully in the Irish Blood Transfusion Service. As Ireland is amongst the first European countries to adapt this technology, continued careful monitoring of the system is crucial.

PO22 | Treatment outcome and scheduling of autologous platelet rich plasma (PRP) therapy in androgenic alopecia–Findings from a retrospective cohort study

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Introduction: PRP has emerged as a newer treatment modality in regenerative medicine, and evidence suggests that it has a beneficial role in hair growth. Most centres utilize commercially available kits for this purpose. Consensus guidelines regarding preparation and application schedule are lacking. This study was done for assessment of clinical efficacy of autologous Platelet Rich Plasma (PRP) therapy in androgenetic alopecia and also to assess the effect of number of PRP applications on the extent of clinical benefit.

Method – This was a retrospective data analysis of 54 patients with AGA who underwent autologous PRP therapy at our centre over a period of 5 years (2016–2021). PRP (>4 fold concentration from baseline platelet count) was prepared from 150 mL autologous whole blood by an indigenous method and was applied at monthly intervals after obtaining written informed consent. Assessment of clinical efficacy across different grades of severity was done by pull test, tug test, global pictures and a patient satisfaction score. Percent negative on Pull (PN-pull) and Tug (PN-Tug) were estimated for assessing the efficacy.

Result – 46 patients ($n = 8$ mild, 26 moderate and 12 severe alopecia) were included in the analysis. Significant improvement was seen in mild and moderate grades (PN-pull-100% after single or two applications). No significant improvement was observed in PN-Tug across all grades of severity irrespective of the number of PRP sessions. Patient satisfaction score (5.2/10) was best in patients with moderate severity of alopecia after two sessions. Global pictures showed increment in hair density in 52%, 46% and 16% of patients with mild, moderate and severe alopecia, respectively.

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Discussion - In patients with mild to moderate alopecia, two applications of PRP showed clinical benefit but the third application provided no additional benefit. PRP is a treatment option for patients with androgenic alopecia. However, controlled trials with longer follow up is required for cementing a standardized protocol.

PO23 | Manufacturing has no effect on the final anti-A/B titre of pooled cryoprecipitate in England

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Introduction: Currently, clinical guidelines for the use of fresh frozen plasma recommend transfusing ABO identical pooled cryoprecipitate when possible. In instances where a patient's blood group is unavailable, pooled cryoprecipitate can be transfused across blood group if all five donations within the pool test high titre (HT) negative at 1:128 for IgM anti-A/B during routine testing, reducing the risk of haemolysis.
In other jurisdictions, pooled cryoprecipitate is transfused across groups without regard for HT status, as the risk of a unit being HT positive is considered low. Multiple manufacturing steps, including freeze-thaw cycles and centrifugation are undertaken to produce pooled cryoprecipitate. To understand if pooled cryoprecipitate could be transfused across ABO group without regard for HT status in the UK, we first need to understand the impact of the manufacturing process on anti-A/B in the final component, specifically, is anti-A/B concentrated in the cryoprecipitate pool.
Methods: A total of 10 Group O pooled cryoprecipitate units were manufactured using donations that tested as HT positive at 1:128 for IgM anti-A/B in August 2021. Samples were taken across the manufacturing process, specifically, prior to the freeze-thaw cycle, (first stage cryoprecipitate) and post freeze-thaw cycle, centrifugation and separation (second stage cryoprecipitate) and assessed for IgM and IgG, anti-A/B by ID-Card method.
The titres from the individual donors that made the pools were averaged to calculate the predicted anti-A/B titre of the cryoprecipitate pools and compared to the tested titre.
Results: In the 50 individual donations tested, IgM and IgG anti-A/B was consistent between first stage and second stage cryoprecipitate.
The observed anti-A/B titre of pooled cryoprecipitate was consistent with the calculated value, based on the average titre of the five donations within the pool.
Conclusion: The anti-A/B titre remains consistent throughout the manufacturing process indicating anti-A/B does not concentrate or partition during manufacturing.

PO24 | The SWiFT trial: Overcoming the challenges of delivering a large randomised controlled trial in the pre-hospital setting

Ms Joanne Lucas[1], Mrs Claire Rourke[1], Dr Laura Green[1,3], Professor Jason Smith[2,4], Mrs Jennifer Mehew[1], Ms Emily Sanderson[1], Mrs Viona Rundell[1]
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Introduction: SWiFT is a multi-centre randomised controlled trial (RCT) of the clinical and cost-effectiveness of pre-hospital whole blood (WB) versus standard care for traumatic haemorrhage. The primary outcome is the proportion of participants who have died (all-cause mortality) or received 10 or more units of blood components in the first 24 h from study entry. 848 patients will be recruited from 10 Air Ambulance Charities in England.
Method: The methodology is complex, requiring close collaboration between transfusion laboratories, air ambulance services and major trauma centres. Randomised boxes containing the trial intervention are prepared by transfusion laboratories and supplied to the air ambulance services. When treating patients suffering major trauma requiring a blood transfusion, the team will open the trial box and administer the components according to local transfusion protocols. Patients are enrolled under an emergency waiver of consent, and informed consent is sought as soon as practically possible. Participants are followed-up by the major trauma centre research teams. The study includes a within-trial cost-effectiveness analysis and qualitative research to assess the acceptability and implementation of the intervention.
Results: The SWiFT trial opened in December 2022. Using a proportionate approach for transfusion laboratory staff and air ambulance crews, over 200 people (transfusion laboratory staff, air ambulance teams and hospital research teams) have been trained over a 6-month period, with 4 air ambulance services and 8 receiving hospitals currently open to recruitment. Randomisation, which had not previously been performed by some transfusion laboratories, has been embedded into standard operating procedures.
Conclusion: SWiFT will be the largest RCT in pre-hospital transfusion research in the UK, utilising the unique strengths of the UK air ambulance services and NHS infrastructure. We have set precedents for interventional transfusion trials, implemented risk-adapted approaches and minimised burden on hospital research teams. We are utilising the skills and knowledge of the air ambulance services and transfusion laboratories to reach a large recruitment target. The methodologies used in this trial could encourage further research in pre-hospital settings by developing pathways and collaborations that can help embed transfusion research into standard practice.

Theme: Diagnostic science and technology

PO25 | The risks of misinterpretation serological Rh and K phenotypes in multi-transfused patients and the role of genotype testing and accurate transfusion history in patient safety

Mrs Vera Rosa[1], Joshna Gopal-Patel[1], Sam Sohrabian[1], Sara Costa[1], Taiwo Adewole[1]

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Introduction: Serological tests performed in samples from multi-transfused patients detect donor and patients' red blood cells (RBCs) Rh/K phenotypes. Donor RBCs, denser than patients' cells, sit at the bottom of sample-tubes, which is where probes in automated analysers aspirate the RBCs. The ratio of aspirated donor/patient RBCs are dependent on the number of transfusions received. There is a potential risk of misinterpretation the Rh/K phenotype in multi-transfused patients if serological results are considered instead of their genotype.
Methods: Red Cell Immunohaematology laboratories (RCI) test samples for Rh/K phenotype using column agglutination technique on the automated analyser (Biorad). Genotypes are performed by PCR, end-point fluorescence (RBC-Fluogene kit) and automated analyser (innotrain).
Patient demographics
Patient 1(P1): Female, 3 years old, thalassaemia major. Patient transfused abroad but number and phenotype of the units received not available. Sample referred to RCI for phenotype/genotype.
Patient 2(P2): Female, 79 years old, heart failure. Urgent sample referred to RCI with crossmatch request. No previous results or detailed transfusion history were discussed between hospital transfusion laboratory and RCI.
Results: P1:Phenotype:C+ c+ E- e+ K-; Genotype:C+ c- E- e+ K-.
P2:Phenotype:C+ c+ E- e+ K-. Anti-Fya (plasma), anti-E (plasma) and anti-c (eluate) identified. Manual phenotype confirmed automated results. Units E- K- Fy(a-) selected as anti-c was assigned as "autoantibody". Genotype:C+ c- E- e+ K-.
Discussion/Potential impact
P1: Without genotype results, it would have been advised, as appropriate blood selection, E- K- which would be associated to a potential risk of sensitisation to c antigen. Anti-c is known to cause haemolytic transfusion reactions (HTR) and haemolytic disease of the fetus/newborn. Patient would have been at risk of harm in potential future transfusions/pregnancies.
P2: Upon investigation RCI was informed that patient had been transfused a large volume of RBCs. Incomplete information of patient's transfusion history resulted in incompatible blood issued. Patient was at risk of HTR.
Conclusion: There is a requirement for reviewing current practice in RCI department as genotype is not performed if serological Rh/K is resolved. As the phenotype can be of the transfused donor's RBCs rather than the patients, genotyping multi-transfused patients can prevent alloimmunisation and avoid transfusion-related complications.

PO26 | Blocked kell phenomenon in a case of haemolytic disease of the fetus and newborn

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Introduction: The K antigen of the Kell blood group system is one of the most clinically important blood group antigens. Anti-K IgG antibodies can cause severe Haemolytic Disease of the Fetus and Newborn (HDFN), with fetal anaemia resulting from suppression of erythropoiesis. Kell glycoprotein is present on early erythroid progenitors; therefore it appears that anti-K causes destruction of these cells before they mature into haemoglobinised erythroblasts. In anti-K mediated HDFN, antibody titre does not show clear correlation with disease severity. The K antigen differs from its antithetical k antigen by only a single amino acid (p.Thr193Met), encoded by a single nucleotide polymorphism, c.578C>T in exon 6 of the KEL gene.
NHSBT Molecular Diagnostics provides a non-invasive fetal KEL genotyping for pregnant women with immune anti-K, at risk of HDFN. Testing is performed using cell-free fetal (cff) DNA isolated from maternal blood from 20 weeks gestation.
Case study: A blood sample from a K-negative pregnant woman with anti-K titre of 1:1024 was received for fetal KEL genotyping at 21 weeks gestation. Real-time PCR testing, using cff DNA extracted from maternal plasma, successfully amplified fetal K allele, and the fetus was predicted to be K-positive. At birth, the baby phenotyped as K-negative with a positive DAT, clinical signs of HDFN (Hb 145 g/L) and anti-K was eluted from the red cells. A false-positive result was queried, and a cord sample was received to confirm the baby's genotype. An allelic-discrimination assay detected a heterozygous K/k genotype, confirming the fetal genotyping, K+, prediction. Four weeks post-birth, the baby presented with a falling Hb (73 g/L) and low reticulocyte count of 35 (likely inhibited erythropoiesis due to anti-K). Repeat phenotyping demonstrated the baby to be weakly K-positive. The baby received two neonatal units and was discharged.
Conclusion: The results suggest a likely case of Blocked-K phenomenon. This occurs in severe HDFN cases, where K antigen sites on fetus/baby's erythrocytes are blocked by maternal IgG anti-K antibody. This maternal anti-K coating prevents agglutination of K-positive red cells by IgM K antigen typing reagents. This causes the baby to be falsely typed as K-negative with routine serological typing reagents.

PO27 | Reduced impact of prophylactic anti-D in the presence of a D variant feto-maternal haemorrhage

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Introduction: D is a large multi-pass membrane protein, with 6 external loops, encoded by the RHD gene[1]. The protein shares homology with CcEe, which are encoded by the RHCE gene[1]. Close tandem gene location (chromosome 1p34 – p36) 5' – RHCE – RHD – 3', opposing orientation and each gene encompassing 10 exons allows DNA exchange[2]. D variant proteins can have altered antigen expression and levels, even so, transfusion or FMH to D negative individuals

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does cause sensitisation[1]. To mitigate alloanti-D formation, prophylactic anti-D (PAD) is administered to D negative women routinely during pregnancy and at potentially sensitising events[3]. There is no altered practice for mothers with a D variant pregnancy[4]. Here we present reduced clearance of D variant RBCs, 72 h post PAD administration, following a clinically significant FMH at delivery.

Methods: Samples were investigated via Beckman Coulter Navios flow cytometric analysis using:

- BRAD3 – FITC (anti-D), AEVZ5.3 – FITC (isotype matched negative control) and BIRMA17C – PE (granulocyte exclusion reagent) (IBGRL Research Reagents).
- PE labelled anti-human Ig (Goat anti Human IgG Fcγ-RPE $F(ab')_2$; Jackson ImmunoResearch Laboratories inc)

The Mollison calculation was used to estimate the FMH volume[4].

Results: Insufficient right shift of a BRAD3-FITC positive population was identified in the D negative delivery sample. Acid elution investigation estimated a 12 mL FMH and 1500 IU PAD was administered. 72 h post PAD, acid elution identified fetal cells. Flow cytometry using a secondary PE labelled anti-human Ig identified a population coated with human Ig. This was estimated to be a 9 mL FMH volume that hadn't yet cleared. Two unrelated non-D variant FMH referrals, with similar FMH volume (11 and 8 mL), were found to be negative by acid elution 72 h after PAD administration.

Discussion/Conclusion: D variant genes cause altered and reduced expression of D antigens compared to the normal protein. During pregnancy PAD treatment may not have an expected mode of action. In the case presented here, D variant cells remained 72 h post PAD. This is unusual and hypothesised to be the result of a reduction or inability of PAD binding to the D variant protein.

PO28 | Stop KIDDing around. Reducing HTR in blood transfusion by detecting antibodies using capture® technology

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Previous SHOT report recommendations have included the need for more sensitive techniques to detect Kidd antibodies and weakly developing antibodies, ensuring all antibody specificities capable of causing HTRs are identified. This prompted a review of the performance of the antibody screening techniques routinely utilised at West Middlesex University Hospital (WMUH) over the last decade. Techniques employed included a manual column agglutination technology (CAT) and an automated solid phase system, Capture®, recognised as the most sensitive of the two techniques (Weisbach et al., 2006). The aim of this review was to ascertain whether using two techniques increased the detection of clinically significant red cell antibodies and if the use of a more sensitive antibody screening technology reduced the incidence of HTRs.

WMUH data review identified 22 clinically significant antibodies detected by Capture that were either negative in CAT or only detectable by enzyme/enzyme IAT, and therefore would have been missed if the routine antibody screen had been performed by CAT. Of the 22 antibodies detected only by Capture, 9 = anti-Jk a, 3 = anti-Jk b and 4 = anti-E, which are the 3 most frequent antibody specificities implicated in HTRs, according to the latest SHOT report (2021).

The 2021 SHOT report also states antibodies were detected in 22/23 of the DHTR reported, but in 20 of these cases, alloantibodies were only detected in the patient's plasma post-transfusion that were not detected pre-transfusion.

Since 2010, WMUH have processed ~28140 G & S/year and issued an average of 7785 red blood cells. No HTRs associated with the identification of an antibody have yet been reported, suggesting the sensitivity of the routine antibody screening method (Capture) has reduced the incidence of HTRs, when compared to the national HTR rate over the same period (1:58210 per RBC issued per annum, calculated from SHOT reports) and improved patient safety.

PO29 | Alloanti-Hy in antenatal patients: A multi-case review

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The Red Blood Cell (RBC) antigen Hy belongs to the Dombrock blood group system (ISBT number 014) and has an antigen frequency of ≈100% in most populations (1,2). Alloantibodies to high incidence antigens exhibit panreactivity in serological investigations, making identification of underlying alloantibodies challenging. Hy- RBCs may be required for patients with alloanti-Hy (3,4,5), but currently there are no published reports of alloanti-Hy causing haemolytic disease of the fetus and newborn (HDFN).

We reviewed the management of four antenatal cases where the presence of alloanti-Hy had been identified. All patients reviewed were found to have the 323G>T Single Nucleotide Polymorphism (SNP) in exon 2 of the DO gene. All cases demonstrated a reduction in strength of anti-Hy titre as pregnancy progressed. No symptoms of HDFN were observed with any of the pregnancies. The decrease in antibody titre observed is characteristic of antibodies to Dombrock antigens (6). Expression of some RBC antigens via their carrier molecules on placental tissue can result in reduced potential of placental transfer and risk of fetal harm (7). Consequently, placental expression of the Do glycoprotein

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may contribute to the reduction in antibody titre and negative Direct Antiglobulin Test (DAT) results. Negative DAT results may also result from adsorption by Do glycoprotein expressed on fetal tissues.

Factors including antibody titre, antigenic expression and varying clinical responses enhance our understanding of why alloanti-Hy has not been known to cause clinical HDFN. The cases reviewed support existing evidence that alloanti-Hy does not cause HDFN, increase understanding of alloanti-Hy in pregnancy and how to manage blood provision for a patient with a rare RBC requirement. Successful management of these individuals relies on several factors including prompt antibody identification, use of Patient Blood Management (PBM) measures including optimisation of Haemoglobin (Hb) levels, identification/mitigation of potential risk factors for antenatal/postpartum haemorrhage, post-delivery management of the patient's Hb and effective communication between hospital teams and external services such as NHSBT. If red cell transfusion is required, ABO compatible, Rh matched, K- units should be selected for transfusion, with use of IVIg/steroids to reduce the risk of Haemolytic Transfusion Reaction (HTR) if Hy+ blood is transfused.

PO30 | Anti-D titre scores determined by immucor's capture-R® select technology: Could these provide a suitable alternative to anti-D quantification by continuous flow analysis during pregnancy?

Ms Lauren Davis[1]

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Introduction: Anti-D causes the most severe cases of Haemolytic Disease of the Foetus and Newborn (HDFN). In the UK, where anti-D is detected during routine antenatal testing, samples are referred to the NHSBT for anti-D quantification (IU/ml) by continuous flow analysis (CFA). This is expensive for referring hospitals, and currently there are no other validated in-house methods for anti-D quantification. This study evaluated if anti-D titre scores (TS) determined by Immucor's non-ABO IgG titration assay using Capture-R® select technology could provide an alternative to anti-D quantification (IU/mL) by CFA in the management of pregnancies at risk of HDFN caused by anti-D.

Method: 22 antenatal EDTA plasma aliquots with detectable anti-D by IAT testing were tested on the Immucor Iris platform using the non-ABO IgG titration assay to determine an IgG anti-D titre, this was manually converted to a TS. The anti-D TS was then converted to a quantification value (IU/mL) by use of a calibration curve and compared to the CFA anti-D quantification value. Anti-D TS cut off values were also evaluated to help determine risk of HDFN.

Results: Converted anti-D TS results were significantly lower than anti-D quantification (IU/ml) by CFA as the slope value (0.60) using Passing-Bablok regression did not include a value of 1 at the 95% confidence interval (0.36–0.86). However, a TS cut off ≧70 was able to identify 12/12 samples at risk of HDFN with an anti-D quantification of >4.0 IU/mL ($p < 0.001$).

Conclusion: The converted anti-D TS values were not comparable to NHSBT anti-D quantification, therefore increasing the risk that some results would not have triggered referral to a foetal medicine unit (FMU) for HDFN monitoring, as their converted anti-D quantification value was <4.0 IU/mL. However, using an anti-D TS cut off value of ≧70 correctly identified all samples that required FMU referral (>4.0 IU/mL). Further work to investigate whether anti-D TS cut off value ranges could be used to determine HDFN risk categories could help provide an alternative to anti-D quantification by CFA in the future.

PO31 | A retrospective audit of ABO mismatch and RhD incompatible liver transplants and passenger lymphocyte syndrome (PLS). Is the incidence of PLS more prevalent in ABO mismatch or RhD incompatible transplants?

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Passenger Lymphocyte Syndrome (PLS) is a condition after a transplant, whereby donor B lymphocytes are transferred to the recipient through transplant. This can then lead to antibody mediated RBC haemolysis. In the last 3 years, there have been 28 ABO and 19 RhD incompatible transplants. 39% of ABO incompatible transplants had an incompatible crossmatch leading to the issue of IAT cross matched blood compatible with the donor organ (Romero et al., 2015).

The principle objectives were to determine how many Liver Transplant patients in the last 3 years were experiencing the effects of suspected PLS (De Bruijn et al., 2017). This was undertaken by conducting a retrospective look-back at the ABO mismatch and RhD incompatible liver transplant patients and the follow-up testing post-transplant.

The data of liver transplant patients over the last 3 years that received an ABO mismatched transplant or a RhD incompatible transplant was collected and analysed for the incidence of suspected passenger lymphocyte syndrome. This was done by checking the patients record for DAT testing post-transplant, anomalous grouping results or if there was an incompatible group-specific crossmatch.

There were $n = 28$ ABO mismatched transplants from January 2020 to May 2023 and $n = 19$ RhD incompatible transplants in the period January 2021–May 2023. From the preliminary data we can see that the incidence of PLS is more apparent in ABO mismatches than RhD incompatible transplants.

Of the 19 RhD incompatible transplants only 5 had follow-up samples, none of which indicated PLS. The remaining 14 patients did not have any follow up samples or transfusion after transplant. Of the ABO mismatched liver transplant recipients 11 (39%) had a positive DAT, an incompatible crossmatch or anomalous grouping reactions and 9 had antibodies detected in their eluate.

Further considerations/research? To consider whether organ perfusion technologies, may have also led to an increase in PLS over the last 2 years?

I could collect data for the renal transplants undertaken; however there is less data available in terms of donor/recipient blood group incompatibility. Additionally, the incidence of PLS in renal transplant patients is less than solid organ or HSCT transplants (Romero et al., 2015).

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PO32 | Evaluation of a new artificial neural network prototype software for automated fetomaternal haemorrhage estimation

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The Kleihauer-Betke (KB) method is commonly employed in transfusion laboratories worldwide for estimation of feto-maternal haemorrhage (FMH) during pregnancy/post-delivery. It is a labour-intensive manual technique subject to high intra and inter-operator variability. Flow cytometry is considered the gold standard method for FMH quantification, but it is often only available in specialist laboratories and is an expensive technique. At the time this project was conducted, no automated analyser could be found in the literature that was available to automatically analyse KB films in routine practice. The aim of this study was to develop a prototype software for the automated analysis of KB films and evaluate its performance.

A prototype software was developed on the CellaVision® DC-1 digital morphology analyser.

It analyses tens of thousands of red blood cells (RBCs) and estimates FMH using films prepared by the KB method.

The software was developed and tested using routine KB films and KB films prepared from spiked blood samples with known concentrations of fetal RBCs. Precision was tested by comparing FMH estimates from the software before and after user review in samples with 0.2%, 0.5% and 1.6% of fetal RBCs to flow cytometry. A comparison study was performed on 30 samples, containing 0%–6% of fetal RBCs, and FMH estimates from the prototype software before and after user review were compared to that of flow cytometry.

Our comparison study results shows good agreement between flow cytometry and our prototype FMH results, which is further improved after user review of images obtained (Bias: 0.84; 95% Limits of agreement (LOA): −5.77 to 7.46); when compared to values obtained for flow versus manual method comparison (mean bias of 0.91; 95% LOA of −16.47 to 14.64), our prototype shows lower mean bias and tighter LOA. Highest precision was seen when >25,000 cells were analysed (SDs observed: 7%–16%)

Our results show good agreement between the prototype software and both flow cytometry and manual microscopy, supporting the feasibility of using artificial intelligence for the estimation of FMH. Such an application represents a viable and robust alternative to replace manual microscopy in clinical laboratories.

PO33 | Feasibility study using DaraEx anti-CD38 inhibitor to overcome pre-transfusion monoclonal antibody interference in an integrated care setting: Enabling improved patient care and cost effectiveness

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Introduction: Monoclonal antibodies (mAbs) improve treatments for Multiple Myeloma (MM). They target the 46kDa CD38 antigen on plasma cells eliminating them via four mechanisms (1–4). Red blood cells show weakened expression of CD38, resulting in interference of pre-transfusion Indirect Antiglobulin Test (IAT) (5) This complicates antibody screening interpretation and blood availability; necessitating patient reattendance with additional referral costs to reference laboratories. Present models favour Dithiothreitol (DTT) treatment methods which are accompanied with inadvertent antigen site destruction notably in the Kell system, haemolysis, increased complexity and turnaround (6).

DaraEx plus has shown potential to overcome interference, offering a simple, safe and cost-effective solution (7, 8). Whilst proven to function, incomplete removal of the strongest patterns leave room for improvement (6, 8, 9). It is the aim of this experiment to modify methods to maximise clearance of interference with the firm desire to improve patient care by performing compatibility testing in the hospital blood bank.

Methods: An adapted DaraEx protocol using 25 µL DaraEx in 50 µL 0.8% red cells with 5 min incubation and gentle agitation. This was followed by separate addition of 25 µL patient plasma with daratumumab or Isatuximab in the Bio-Rad-ID system to provide proof of concept (9, 10) Alongside this the limits of detection of serially diluted antibodies (Anti-D, K and Fya) in the presence of DaraEx and mAbs are noted. These included NHSBT 0.1IU weak Anti-D, Anti-K and Anti-Fya to ensure the adapted protocol can detect atypical antibodies (11) Dara Ex PC control confirms DaraEx functionality in the presence of mAbs and atypical antibodies.

Results: Recently treated MM patients showed persistent IAT interference following the express protocol. Varied expression of CD38 impacted degree of interference, supporting the importance of cell selection. (8) The adapted protocol showed promise to assist clearance and demonstrate proof of concept harmonising Bio-Rad manufacturers volume limits. The serial dilutions allow detection of 0.025 IU Anti-D, 75% Anti-K and 50% Anti-Fya respectively.

Conclusion: MM remains an incurable haematological malignancy. Continued research into CD38 inhibitors or integration of DTT into column agglutination technology are propitious and avoid specialist referral (8, 12). Overcoming pre-transfusion interferences must pursue a teleological approach to enhance patient care.

PO34 | Neutralisation of CD47-targeted immunotherapies in patient samples: Facilitating serological investigation and improving patient care

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Soluble recombinant (sr) blood group antigens are used to facilitate antibody investigations. These proteins can be used as neutralising

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reagents, to inhibit 'nuisance' non-clinically significant allo-antibodies, or therapeutic monoclonal antibodies (TMabs) in patient samples.

TMabs are emerging as promising immune-based treatments in the management of malignancies. One target for immunotherapy is CD47, a ubiquitously expressed transmembrane glycoprotein that functions as an anti-phagocytic signal to prevent healthy cells from being targeted for destruction by macrophages by binding to CD47's cognate receptor, SIRPα. This mechanism is exploited by cancer cells which frequently over-express CD47 to prevent immune detection. Blocking the interaction with SIRPα using a CD47-binding drug (e.g., with a TMab) enables tumour cell phagocytosis and activates an anti-tumour T-cell response. To date, no CD47-targeted drug has gained market authorisation, but multiple therapies are in development including both TMab and non-antibody biologics. The largest clinical trial in the UK is ENHANCE, which is monitoring the effect of the anti-CD47 TMab, Magrolimab, in combination with standard of care in the treatment of myelodysplastic syndrome.

CD47 is expressed at high levels on RBCs so there is the potential for CD47-targeted therapies to induce transient anaemia in a patient population already requiring transfusion support. This is compounded by the potential for significant drug interference with cross-matching and antibody identification. Indeed, the binding of Magrolimab in patient samples to CD47 on reagent red cells results in strong pan-reactivity against screening cells by IAT with LISS and normal saline which persists after ficin, papain, trypsin, chymotrypsin or DTT treatment.

NHSBT has developed a sr protein based on expression of the extracellular domain of CD47 as a fusion protein with IgG Fc. srCD47 is recognised by anti-CD47 TMabs such as Magrolimab and inhibits Magrolimab in patient plasma samples with no effect on the detection of a panel of clinically significant antibodies (Rh, MNS, Kidd, Kell, Duffy).

PO35 | Band 3 protein Ala858Asp substitution results in variant expression of Dib antigen

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Introduction: The Diego blood group system consists of 23 antigens, mainly of very low prevalence, carried on the red cell anion exchange protein, band 3 (or AE1). This multi-pass intrinsic membrane glycoprotein, encoded by the SLC4A1 gene, is the most abundant red cell membrane protein with important structural and transport roles. The high prevalence Dib antigen, encoded by p.Pro854 in band 3, and the antithetical Dia antigen (p.Leu854), result from a single nucleotide change (c.2561C>T) in exon 19 of SLC4A1. Dia is most common in native South Americans but is rare in those of European origin.

Methods: Samples from a blood donor, suspected as Di(b-) by rare donor screening tests, were investigated. Serological techniques included LISS tube IAT and direct agglutination. Sequencing of SLC4A1 was performed by targeted next generation sequencing. Gene alignments were performed using Illumina MiSeq Reporter and visualised with Integrative Genomics Viewer.

Results: The donor was serologically typed as Di(a+) but showed variable reactivity with anti-Dib reagents. Three monoclonal anti-Dib reagents gave positive reactions, whilst one showed very weak/negative reactivity. One example of polyclonal anti-Dib gave a very weak positive reaction, whilst a second example was negative with the donor cells. SLC4A1 sequencing showed heterozygosity for c.2561C>T, encoding p.Pro854Leu, consistent with a Di(a+b+) phenotype. Heterozygosity was also observed for a further mutation in the same exon, c.2573C>A (rs121912751), encoding p.Ala858Asp, very close to the Dia/Dib antigenic site. This mutation was carried on the DI*B allele in this donor, presumably resulting in the observed variant Dib expression. This very rare mutation (GnomAD frequency 0.00007) has been previously observed exclusively in South Asian populations but has not been reported to result in any blood group phenotype.

Conclusions: We have shown that the band 3 p.Ala858Asp substitution affects expression of Dib antigen, resulting in variable reactivity with anti-Dib typing reagents. The donor in this case carries a wild-type DI*A allele, together with a variant DI*B allele c.[2561C; 2573A], resulting in a Di(a+bvar) phenotype. The p.Ala858Asp mutation is predicted to fall within a transmembrane domain, so is unlikely to result in expression of any low prevalence antigen.

PO36 | The reliability of A1 phenotyping results in an external quality assessment (EQA) programme supporting ABO incompatible renal transplantation

. Katy Veale[1], **Richard Haggas**[1], Amy Wheatley[1]

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A_1 typing is currently an unscored part of the UK NEQAS BTLP ABO titration EQA programme, which supports ABO-incompatible organ transplantation. Obtaining the correct A_1 result is important in selection of an ABO-mismatched renal transplant to minimise the risk of rejection associated with ABO-incompatibility.

Material is prepared from leucodepleted red cell donations. Sometimes, material is used to prepare more than one sample but this is not known by the participants and therefore, should not influence the results.

Analysis of incorrect A_1 typing results was undertaken for 14 exercises, each containing three samples. The correct result is based on the consensus, samples with <90% consensus were analysed separately for this study.

A total of 42 samples were issued and 3437 A_1 typing results analysed.

- 34/42 samples (2776 results) achieved a consensus result by >90% laboratories

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- 17/718 (2.4%) gave false positive results
- 19/2058 (0.9%) gave false negative results

Of the other eight samples:

- All came from samples originally determined as A_1 negative by the supplier
- 475/661 (71.9%) recorded negative results
- 128/661 (19.4%) recorded positive results
- 58/661 (8.8%) recorded not determined
- 3/8 samples were confirmed to be Aint phenotype, the remaining five were not referred for confirmation

When testing an organ donor there are risks associated with incorrect A_1 results. False negative results could increase the risk of rejection due to ABO-incompatibility. False positive results, present a lesser but still significant risk of a suitable organ not being utilised for transplant, causing delay to the intended recipient.

The Aint phenotype does not produce reliable results with A_1 reagents, and positive reactions did not appear to be associated with a particular reagent. It is not known what affect this phenotype has on ABO-incompatible organ transplantation.

Commercial anti-A_1 reagents are usually prepared from Dolichos biflorus lectin. In its raw form this agglutinates cells of Aint and A_2 phenotypes; at a suitable dilution it will not react with A_2 cells. The use of lectin reagents instead of a true antibody, may be the reason for a higher rate of false positive than false negative results.

PO37 | Unlikely but not mission impossible–Haemolytic transfusion reactions due to antibodies low to incidence antigens

Ms Tracey Tomlinson[1], Victoria Tuckley[2], Nicola Swarbrick[2], Debbi Poles[2], Shruthi Narayan[2]

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Introduction: Antibodies to low incidence antigens (AILA) are rare in the UK patient population; there is therefore no requirement to include these antigens in screening cells or panel cells used to perform pre-transfusion testing in the UK. The adoption of electronic blood issuing (EI) procedures, which omit a serological crossmatch, has further decreased the likelihood of these antibodies from being detected. A study completed by Garratty in 2003 concluded the risk of missing an a clinically significant antibody due to EI at 1/500,000 transfusions. The low risk of missing an antibody, combined with the low incidence of antigen positive units makes the chances of a haemolytic transfusion reaction (HTR) due to AILA unlikely, but not impossible.

Method: The SHOT haemovigilance scheme collects data on adverse events and reactions in blood transfusions from UK healthcare organisations. Cases reported during a 5-year period (2018 to 2022) were reviewed to identify the frequency and severity of HTR due to the presence of ALIA.

Results: A total of 223 HTRs were reported to SHOT during the period. 187/223 had red cell antibodies detectable in the post-transfusion sample which had not been detected during the initial compatibility testing. In 22 cases an ALIA was detected, 4 of which in combination with other red cell antibodies. The most common specificity was anti-Wra, which occurred in 9 cases. Other specificities included anti-Coa, Doa, Kpa and Lua.

In 15 cases the AILA was identified by a positive serological crossmatch during the laboratory transfusion reaction investigation.

No cases resulted in major morbidity in the patient.

Conclusion: HTR due to antibodies to low incident antigens remains a risk of transfusion. However, these are rare and have not been reported as causing major morbidity in the last 5 years of SHOT reports. The antibody is often only detected by performing a serological crossmatch. It is therefore important that a serological crossmatch using an indirect antiglobulin technique (IAT) is included in the transfusion reaction investigation performed by the laboratory. Once an ALIA is detected the patient should be considered not eligible for electronic issue and future units issued using a IAT crossmatch.

PO38 | Novel SLC14A1 heterozygous mutations affecting the expression of Kidd (JK) antigens

Vanja Karamatic Crew[1], Louise Tilley[1], Benjamin Jones[1], Shane Grimsley[1], Nicole Thornton[1]

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Introduction. The three Kidd (JK) blood group system antigens, Jka, Jkb, and Jk3, are carried on Solute Carrier Family 14 Member 1, a multipass membrane glycoprotein functioning as an erythrocyte urea transporter. Antibodies against JK antigens are clinically significant, causing both haemolytic transfusion reactions and haemolytic disease of the fetus and newborn. Whilst polymorphic Jka and Jkb are encoded by a single nucleotide substitution in the SLC14A1 gene, ISBT currently lists 12 SLC14A1 mutations associated with modified expression of Jka and six with modified Jkb expression. A further 45 SLC14A1 mutations are associated with the rare Kidd-null phenotype, characterised by absence of all JK antigens.

Methods. We investigated three unrelated individuals (one patient; Pt1 and two donors; D1 and D2) with apparent variant JK antigens. Standard serological investigations were performed and all exons of SLC14A1 were Sanger sequenced.

Results. Pt1 cells were found to be Jk(a+wkb−) Jk3+wk. Pt1 plasma contained anti-Jkb. D1 cells showed a Jk(a−b−) Jk3+wk phenotype, whilst D2 cells were Jk(a−b+wk) Jk3+wk. SLC14A1 sequencing revealed the following genotypes: JK*A/A (Pt1) and JK*A/B (D1 and D2). All three samples shared a rare heterozygous novel mutation c.352G>A, p.Ala118Thr (rs778632720). In Pt1, this mutation must be carried on a JK*A allele, apparently causing weakness of Jka expression in this case. D1 sequencing also revealed an additional known heterozygous mutation c.810G>A, p.Ala270Ala, previously reported on either JK*A or JK*B alleles (JK*01N.19 and JK*01N.17

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respectively), associated with lack of expression of Jka or Jkb. D1 phenotype indicated that the two heterozygous mutations were carried in trans, affecting both JK alleles, although the exact composition of the alleles remains to be determined. In D2, another rare heterozygous novel mutation was found, c.142C>T, p.Gln48Ter, presumed to be carried on the JK*A allele in this case, abolishing expression of Jka. The weakness of Jkb is presumed to be due to c.352G>A, carried on the JK*B allele.

Conclusions. Two novel and one previously described SLC14A1 mutations associated with depressed, or lack of, expression of Jka and/or Jkb antigens were observed in three individuals, showing the underlying heterogeneity of the genetic bases of weakened JK antigens.

PO39 | Two novel D variants

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Introduction: The investigation of variant D antigens is necessary to determine the risk of alloimmunisation due to pregnancy and transfusion. Outcomes inform decisions to administer prophylactic anti-D and if D− red cells should be selected for transfusion. Here we describe the resolution of D antigen type of two antenatal cases using both serological and molecular techniques.

Methods: Standard serological investigations using several monoclonal anti-D reagents including the ALBAclone RhD Variant Investigation Kit (Quotient BD) were performed.

Genomic DNA sequencing of RHD and RHCE genes was performed using Sanger sequencing on the Thermo Fisher ABI3500XL Genetic Analyzer.

Results: Case 1:

Red cells were only reactive against standard anti-D reagents in the IAT phase. Reactivity with the ALBAclone RhD Variant Investigation Kit antisera did not match an expected pattern for a listed variant. Reactions of varying strength were seen with 5 of the 12 kit components.

Phenotype: C+ c+ E− e+

RHD mutation: 860T>C (L287P)

Case 2:

Red cells reacted with all anti-D reagents tested, including those tested by direct technique and with all components of the ALBAclone RhD Variant Investigation Kit antisera. Reactions observed were slightly weaker than D+ (R1r) control cells.

Phenotype: C− c+ E− e+

RHD mutation: 178A>C (I60L), 1196C>T (A399V)

RHCE mutation: 733C>G (L245V)

Discussion:

Genomic DNA sequencing for both cases detected novel alleles not listed in ISBT RHD blood group allele tables.

It is not known if the D variant antigens are weak and/or partial in nature, or if anti-D would be formed upon exposure to D+ red cells. Neither individual had formed alloanti-D at the time of testing. Both antenatal cases were regarded as D− for the purpose of anti-D prophylaxis, which was administered as per standard UK guidelines (BCSH guideline for the use of anti-D immunoglobulin for the prevention of haemolytic disease of the fetus and newborn, 2014).

Theme: Education and training

PO40 | The biomedical scientist empowerment, education and discussion group: Improving access to education and continuing professional development for blood transfusion professionals

Mr Danny Gaskin[1,3], Ms Selma Turković[1,3], Ms Sasha Cooke[1], Mr Anas Nasir[2]
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Introduction: In response to the COVID-19 pandemic, the NHS Blood and Transplant (NHSBT) Patient Blood Management (PBM) team, with the support of the London Regional Transfusion Committee, created a remote, no-cost education group for biomedical scientists aimed at providing ongoing professional development for transfusion laboratory professionals. The popularity of the group led to the availability of resources that allowed for the continuation of the group beyond the pandemic, with membership opened to all healthcare professionals interested in blood transfusion.

Methodology: The group convenes monthly and invites industry experts to deliver lectures on specialist areas of blood transfusion, followed by discussion. The curriculum is flexible and responsive to feedback, incorporating key industry recommendations, such as those found in the annual SHOT report. The group has covered a wide range of topics, including antibody identification, appropriate use of blood components, haemoglobinopathies, advances in information technology, inventory management, gender reassignment, provision of rare blood, transfusion delays and emergency preparedness, among others.

Results: Over 2800 healthcare professionals worldwide have joined the group, with an average attendance of 165 individuals per meeting. Survey results from 1390 delegates between April 2022 and April 2023 demonstrated high ratings for the education provided during the sessions, with an average rating of 4.72 out of 5 for information quality and 4.58 out of 5 for information relevance to their day-to-day work. Furthermore, 99.1% of all respondents believed that the education provided during the sessions enabled them to offer better service to patients and service users.

Conclusion: The NHS BT PBM team's remote and accessible model has been successful in providing ongoing education and continuing professional development for blood transfusion professionals beyond the pandemic. This cost-effective model has become a regular feature in hospital transfusion continuing professional development, enhancing individual and service performance, and could be a valuable consideration for other healthcare disciplines. The group has received industry recognition, including the Bill Chaffe Unsung Hero Award at

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the British Blood Transfusion Society Annual Conference in 2022 and the Academy for Healthcare Science Inspiring the Healthcare Science Workforce of the Future Award at the UK Advancing Healthcare Awards in 2022.

PO41 | Clinical decision-making and authorising blood component transfusion: Improving patient experience and service delivery by developing the healthcare workforce through virtual education

Mr Danny Gaskin[1], Mrs Anne Davidson[1], Ms Sasha Cooke[1]
[1]NHS Blood and Transplant, Manchester, United Kingdom

Introduction: The NHS Blood and Transplant Patient Blood Management Team provides a four-day virtual course to teach the theoretical knowledge that underpins the decision to authorise blood component transfusion.

The course is designed for registered and regulated healthcare professionals who are working towards making clinical decisions and providing written instructions for blood component transfusion. The course was developed in accordance with United Kingdom & Ireland Blood Transfusion Network's framework on Clinical Decision-Making and Authorising Blood Component Transfusion and is accredited by the Royal College of Nursing.

The aim of this study is to evaluate the effectiveness of the course in terms of its impact on patient care and service delivery.

Method: We surveyed past attendees who had completed the course over six months ago. The survey included questions on the clinical setting in which they worked and their experience in authorising blood component transfusion. We also asked them to evaluate the impact of the course on their practice, patient care and service.

Results: Seventy-six past attendees responded to the survey. The respondents worked in various clinical settings across both medicine and surgery. Seventy-four of which reported that the course met their foundation learning needs.

Sixty respondents were now authorising blood components independently and 8 were authorising under supervision. Of those, 92.1% authorised red cell transfusion at least monthly. For platelet transfusion, 71.1% authorised at least monthly. For fresh frozen plasma transfusions, 35.4% were authorising at least monthly.

Four respondents reported having a decision to authorise transfusion overruled, and 11 respondents reported a decision not to authorise transfusion overruled.

Seventy-four respondents reported that the introduction of non-medical authorisation in their clinical area had resulted in a positive impact on patient care and experience.

Conclusion: Overall, the course was found to be effective in supporting healthcare professionals in making clinical decisions for blood component transfusion. Most respondents felt that the course had met their learning needs and had a positive impact on patient care and experience. This data suggest that the course can contribute to improved patient care and help healthcare professionals make confident decisions about blood component transfusion.

PO42 | Leveraging Nigeria's youth population to enhance voluntary blood donor recruitment and retention–Creating the secondary school blood safety programme in Nigeria

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Introduction: A major challenge for blood transfusion services in sub-Saharan Africa is low levels of recruitment and retention of voluntary non-remunerated blood donors[1]. In Nigeria, up to 60% of the population is aged <25 years,[2,3] necessitating the National Blood Service Commission (NBSC) collaboration with the Federal Capital Territory (FCT) Secretariat of Education to create the Secondary School Blood Safety Programme (SSBSP). This initiative is designed to raise awareness among students and teachers in secondary schools about the importance of blood safety and regular voluntary blood donation and encourage them to become regular voluntary blood donors on attainment of 18 years in keeping with Nigeria's National Blood Policy.[4,5]

Methods: A project team was constituted in 2012 reporting to the National Coordinator, National Blood Transfusion Service, and undertook the following activities:

- Advocacy visits to the Federal Ministry of Education and FCT Education Secretariat.
- Developed a training curriculum on blood safety and voluntary non-remunerated blood donation for secondary school students and teachers.
- Secured approval from the FCT Secondary Education Board.
- Advocacy visits and sensitisation of five (5) pioneer schools.
- Formation and inauguration of Secondary School Blood Safety Clubs.
- Launch of the SSBSP essay competition.

Results: Since its formation in 2012, SSBSP has recorded the following achievements:

- Growth to cover an additional 15 secondary schools in FCT.
- Sensitisation of all students, teachers, and non-teaching staff.
- Formation, inauguration, and election of leaders of Secondary School Blood Safety Clubs in nineteen (19) schools.
- Training of all club coordinators and executive members.
- School debates, quizzes, panel discussions, essay, art and spelling bee competitions, and symposia on blood safety.
- Voluntary blood donation drives for teaching and non-teaching staff.

Conclusion: This programme has provided Nigeria's NBSC with the platform to reach potential voluntary blood donors and provide them with the knowledge and role modelling necessary to motivate them to become regular voluntary blood donation advocates and donors. Building on Nigeria's youth population, SSBSP has the potential to enhance donor recruitment and retention and address the country's safe blood needs and save the lives of millions of Nigerians.

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PO43 | Consent for blood transfusion: UK development of resources to support SaBTO recommendations

Mr Alister Jones[1], Anne Davidson[2]
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Introduction: Consent for blood transfusion is an integral part of patient blood management; in 2020 the advisory committee on the safety of blood, tissues and organs (SaBTO) issued updated guidance[1] on this, with recommendations that the UK blood services provide:

- "a standardised source of information for patients who may receive a blood transfusion in the UK",
- "a centralised UK-wide information resource for healthcare practitioners to facilitate consent for transfusion discussions".

Method: Delivery on these recommendations was handed to the UK and Ireland Blood Transfusion Network (UK & IBTN) expert group designed to facilitate the exchange of information, learning and development of clinical blood transfusion, and patient blood management programmes.
Two task and finish groups, with UK wide representation, were established to develop:

1. patient focussed resources,
2. resources aimed at healthcare practitioners (HCPs).

It was agreed that both groups would produce these as web-based resources, to be hosted on the transfusion guidelines website.
Results: The patient information leaflet 'Receiving a Blood Transfusion' was the first resource produced, followed by an easy read version, mixed media capability (audio and screen readable text version) and translations.
For HCPs a step-by-step guide in a 'checklist' format was created, supported by material referencing up to date information. Rendered into a draft webpage and piloted with a selected group of HCPs, feedback was acquired via an online survey; further revisions were made based on feedback and the finished products were then submitted to the UK & IBTN for sign-off.
For the patient directed webpage it was recognised that feedback would be best gained once published, allowing patients to indicate what else would be helpful rather than asking up front what should be included. Using virtual focus groups/questionnaires, we plan to canvas patient/public feedback to inform the future development of the patient pages.
Both webpages were then made live on the transfusion guidelines website:

- https://www.transfusionguidelines.org/transfusion-practice/consent-for-blood-transfusion/consent-information-for-patients
- https://www.transfusionguidelines.org/transfusion-practice/consent-for-blood-transfusion/guidance-for-healthcare-practitioners-involved-in-this-role

Discussion: The UK & IBTN has successfully met the SaBTO recommendations, with collaborative working yielding effective resources designed specifically to support the knowledge, understanding and, critically, the dialogue between the patient and decision maker around consent to transfusion.

PO44 | NHS blood and transplant (NHSBT) training modernisation. Transformation of donor carer clinical induction training from pre COVID 2019 to post amber alert 2023

Ella Poppitt[1], Charlie Bobin[1], Elise Ainger[1], Mary Joy Appleton[1]
[1]*NHS Blood and Transplant, United Kingdom*

Motivation
Significant drivers and lessons learnt from the pandemic response, feedback from key stakeholders along with the introduction of a new Learning Management System created the opportunity to provide:

- Consistent learner journeys with a focus on learning needs
- Blended approach to learning, introducing flexibility on where and when learning is undertaken, increasing learner focus
- Clear assessment points for theory and continual skills assessment within the workplace
- Candidates operational as quickly as possible
- Employ best practice learning
- Greater insight to learner progress, tracking data and report completion
- Approach

Complete revision of the approach to training delivery, including the creation of the enabling role, challenging existing cultures and attitudes towards training, and ensuring we were able to accelerate the progress of candidates, using digital learning, virtual classrooms, simulation days and on-session development. Improving the nationalised approach to training delivery whilst creating a central point of progress monitoring and data collection.
Results: We have achieved multiple, flexible training pathways that can

- Be scaled up or down, depending on demand
- Enable learners to achieve competency within a four-week period for whole blood collection (reduced from 8 to 12 weeks)
- Support teams with high levels of turnover with an accelerated training pathway, supported by enablers
- Provide pathways for smooth transition into Consolidation and Expertise
- Existing colleagues now have access to current learning

Furthermore,

- attrition levels have dropped from 33% to 13%
- engagement with the Operational team has improved
- evaluations from both learners and managers are contributing to the continual development of training delivery.

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Conclusions: We have proven that it is possible to transform training delivery and can be confident that all candidates are benefitting from receiving the same standard of theory delivery and simulation training, and that their knowledge and understanding is tested systematically, allowing us to achieve standardised national practice. In addition to this we have had the pleasure of sharing this progress with colleagues from other worldwide Blood Authorities.

PO45 | The impact of ultrasound guided cannulation on patient apheresis experience

Samuel Ntakirutimana[1], Marc Lyon[1], Bridget Audsley[1], Daniel Putensen[1], Nicola Newbound[1]
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Introduction: Adequate vascular access is paramount for a successful apheresis procedure. Often patients with difficult peripheral access need placement of a central venous access device (CVAD) to perform an apheresis procedure [1]. We evaluated the introduction of ultrasound guided cannulation (USGC) and found that it reduces the need for CVAD significantly, resulting in reduction in hospital admissions and theatre time, and improving patient experience.

Methods: Data was collected prospectively over an eight-month period on all patients undergoing USGC of a peripheral vein in five different NHSBT apheresis units. Outcome of each cannulation attempt was documented via a specifically designed electronic questionnaire.

Results: 255 USGCs were performed on 83 patients who had a total of 159 apheresis procedures. All 255 cannulation attempts were successful, with a mean time to perform cannulation of 3.04 min. Devices used (for access and return): 18 g cannula ×117; 20 g cannula ×73; 17 g fistula needle ×50; 18 g power injectable midline ×9; device not recorded ×6. The type and size of the vascular access device was determined by (i) type of apheresis procedure, (ii) placement for access or return, (iii) patient vasculature and patient's preference. In total 109 central venous catheters were avoided. Patient feedback was collected in 215/255 procedures. Feedback was consistently positive: "Very pleased to have this procedure without having a line insertion and hospital admission", "Pleased, as procedure run smoothly", and "Happy".

Discussion: Implementation of USGC in apheresis units has significantly reduced the need for CVADs, even in those patients with no visible or palpable veins (2). Our audit supports these findings. 109 central venous devices were avoided. The results of this intervention have had a positive impact on hospital resources, outcome of apheresis procedures and patient satisfaction. We also found the introduction of a power injectable midline may be beneficial for those patients who have a series of short-term apheresis procedures. However, in our experience these midlines mostly work for the return site, not access. We are now planning to roll out USGC to all eight NHSBT units. Disclosure: Financial Support: This Study has been supported by Terumo BCT.

PO46 | A retrospective study of neonatal red cells transfusion practices

Dr Ayesha Shakhawat[1], Ms Seleni Reyes[1]
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Background: Blood transfusion plays a crucial role in day-to-day clinical practice. This study aims to evaluate red blood cell transfusion practices in neonates at St. Mary's Hospital in London. Since neonates are the most vulnerable group of patients, we have set three objectives: examining the significant reasons for neonatal transfusions, evaluating whether neonates are being transfused for appropriate indications and investigating the efficiency of managing neonatal transfusion requests by reducing donor exposure and minimizing wastage.

Methodology: A retrospective study of 6 months has been conducted. All neonatal transfusion request forms received in our laboratory were collected, and relevant records of each individual neonate were studied and analysed using Microsoft Excel spreadsheet. The main variables analysed included reasons for neonatal transfusion requests, checking the donation numbers of multi-satellite packs related to transfused neonates, Hb levels, and the outcome of the transfusion. The data were processed anonymously.

Results: This study revealed that a total of 32 neonatal infants were transfused out of 270 request forms received. The O and Rhesus positive blood group were predominant in this study. Among the transfused neonates, 25 (78%) were appropriately transfused, in compliance with the recommended guidelines of the British Society for Haematology (BSH). Interestingly, anaemia (56%) was the most common reason for neonatal red blood cell transfusion at our hospital, followed by sepsis (19%), pneumonia (14%), and surgical intervention (10%). Approximately 66% of neonates were transfused multiple times; however, only 5 neonates (24%) were allocated the same multipack's donation number.

Conclusion: As demonstrated above, neonatal red blood cell transfusion is essential for managing new-born infants with various conditions. Efforts should be made to reduce donor exposure. A better understanding of the laboratory's neonatal transfusion practices could help improve the laboratory's practices to ensure the best possible outcomes for vulnerable patients, such as neonates.

PO47 | Use of A3 tools to improve compliance to training and competency assessment in a high-pressure post-pandemic laboratory

Mrs Meghan Mcintosh[1], Mr David Bruce[1], Ms Nicola Main[1]
[1]*Nhsbt, Newcastle, United Kingdom*

Introduction: Practicing Biomedical Scientists are obliged to provide evidence of their competence (required for UKAS ISO15189 compliance, HCPC registration and to meet ULTLC standards). Within the NHSBT Red Cell Immunohaematology (RCI) laboratory, matrices and key performance indicators (KPIs) are reviewed monthly by senior

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management to ensure acceptable compliance (non-compliance <5%). During the COVID-19 pandemic an amnesty for maintaining evidenced competency was introduced (accepted by accreditation bodies). The Newcastle RCI laboratory also experienced a post pandemic reduction in staffing levels. Collectively this resulted in an excessive expiration of evidenced competencies. We present the successful output of an improvement event to recover Training and Competency (T & C) to acceptable levels.

Methods: A3 problem solving was undertaken to identify the current state, root cause and future state. Solutions were tested and adopted if found to be successful.

Results: Current state mapping and root cause analysis showed:

- A lack of time to identify T & C compliance due to poor staffing levels and increased workload.
- No visual management (VM);
- No reminder of expiry of T & C and
- Poor filing of training records

Solutions included:

- Allocated time slots for staff to undertake T & C.
- Introduction of T & C VM board. This displayed all staff names with an indicator of their T & C compliance status (red = non-compliant; green = compliant). The board is managed by a dedicated staff member.
- Monthly e-mail reminder of expired and due to expire T & C.
- New filing system

Non-compliance for training and competency before solutions was 12% and 28% respectively. Post solution introduction saw a decrease in non-compliance to both T & C to 3%.

Discussion/Conclusion: This project demonstrates the usefulness of A3 thinking in problem solving T & C in RCI, identifying root causes for non-compliance and solutions that resulted in meeting departmental KPIs.

PO48 | Transfusion revision recipe for success

Mrs Nicola Wilkes[1], Ms Laura Eastwood[2], Dr Tom Bullock[3], Mr Shane Grimsley[3], Ms Sara Wright[4], Mrs Chloe George[5], Ms Josephine McCullagh[6], Ms Alison Muir[7], Ms Mandy O'Shea[8], Ms Samantha Reynolds[9], Dr Matthew Hazell[3]

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Introduction: Higher Specialist Scientific Training (HSST) is a five-year work-based programme of bespoke training to become eligible to apply for Consultant Clinical Scientist (CCS) roles. The National School of Healthcare Science (NSHCS) sets the curriculum, but training is self-led through job planning with their employer. Elements include:

- University of Manchester taught Postgraduate Diploma (Leadership and Management in Healthcare)
- OneFile portfolio online assessment tool (aligned to NSHCS curriculum)
- Manchester Metropolitan University Doctoral level research project (or equivalent research project)
- Royal College of Pathology (RCPath) examinations

Completion enables FRCPath qualification and eligibility to apply for Consultant Clinical Scientist posts.

The RCPath examinations in Transfusion for scientists are new with eleven candidates so far. The RCPath offer exams once a year, first intake was 2017, with four further intakes up until 2023. Exam format was established as face-to-face but, since the COVID-19 pandemic part 1 examination has evolved into a virtual format and has not since reverted.

On introduction of HSST the NSHCS launched a new curriculum where there was no established pathway for exam preparation.

Methods: The Multi-Organisational TraNsfusIon HSST SuppOrt NetwoRk (MONITOR) consists of all current transfusion HSSTs. Members meet virtually using a collaborative whiteboard (miro), to understand challenges and training related requirements. We surveyed members to understand their readiness for examinations.

Results: The following factors were considered key to success by MONITOR group members surveyed:

- Individual gap analysis against NSHCS curriculum
- Utilising subject matter experts (non-clinical modules)
- Practice questions/ viva scenarios
- Clinical case sessions
- On call clinical rota participation
- Trainee led group sessions (highlighting good practices)
- Online educational training sessions
- Conference attendance
- Reading transfusion guidelines
- Handwriting and typing clinical notes

Discussion/ Conclusions: The MONITOR group has brought together all current transfusion trainees, allowing identification of key items that can form a structured approach to exam preparation. Transfusion HSST cohorts have grown and as a result, trainees have developed a more structured study pathway for success. We aim to continue the positive feedback loop with future trainee cohorts and build up a resource base to cascade learning.

PO49 | Nurse professional development day (PDD)

Ms Georgina Blevins[1]

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Introduction: The Nurse Professional Development Day (PDD) was launched in response to the number of Nurses leaving NHS Blood and Transplant. A face-to-face day dedicated to their professional development needs with networking, education and supervision at its core. The aim to retain talented Nurses, improve education equity and ultimately positively influence donor experience.

Method: Firstly, the number of Nurses leaving was captured and their reasons via exit interviews since 2020. The content was based on themes including incivility and team culture, leading authentically, professional loneliness and accessing clinical supervision. Engagement with stakeholders was crucial to the successful roll out. Initially this came from the Nursing Leadership Team, where it was agreed to pilot in Blood Supply (BS). Engagement was then achieved at BS national managers conference where the booking form was launched.

Results: 25% of BS teams Nurses have completed their PDD. 48% currently engaged in the booking process and 27% not yet engaged, with justification. The feedback rate is 86%. Rateable questions included, did the day contribute to your professional development? 4.7/5 and how beneficial do you think this day would be to other Nurses? 4.8/5. Themes include useful and valuable information; professional self-care; team functionality; valuable networking; strategies to empower Nurses and constructive reflective practice discussing both clinical and non-clinical scenarios to shape and improve practice.

Conclusion: Originally a reaction to the number of leavers, Nurse engagement has since been used to ensure PDD are a proactive resource in scoping for the future needs of the workforce. Nurses have now become their own key stakeholders in their professional development. The original ethos of the PDD which is 'not one size fits all' ensures the PDD continue to deliver what the workforce needs for today and tomorrow. Consequences of the PDD have led to Nurses feeling empowered to launch quality improvement projects to constructively shape and influence NHS Blood and Transplants practices for the workforce and our donors.

PO50 | Case study: Management of an antenatal case with a rare antibody against the high frequency antigen 'N'

Ms Laura Eastwood[1], Ms Dianne Armstrong[1], Ms Bryony Hodgson[2], Mr Robert Lees[1], Ms Rosselyn Ngadze[2], Ms Abigail McNeill[3]

[1]NHS Blood and Transplant, Barnsley, United Kingdom, [2]Doncaster and Bassetlaw NHS Teaching Hospitals Foundation Trust, Doncaster, United Kingdom, [3]International Blood Group Reference Laboratory, Filton, United Kingdom

Introduction: Glycophorin A (GPA) carries the M and N antigens of the MNS blood group system at the N-terminus. The first 26 amino acids of GPA, which carries the N antigen, are identical to Glycophorin B (GPB). 'N' is used to denote the N activity of GPB. Whilst anti-N is not generally considered clinically significant, patients who form anti-'N' have the rare N- S-s- U- phenotype, requiring rare N- S-s- U- red cell units. There is a lack of evidence regarding the clinical significance of anti-'N', however, this may be due to the extreme rarity of the antibody.

This case is presented to share our experiences of managing an antenatal patient with anti-N, plus an antibody against the rare high frequency antigen, 'N'.

Method: NHSBT and hospital teams discussed the patient's antenatal management due to the small number of reported cases of anti-'N'. The pregnancy was monitored as per BSH guidelines for clinically significant antibodies for Haemolytic Disease of the Fetus and Newborn (HDFN). Enquiries were made to assess bleeding risk and establish a delivery plan. Anti-'N' was titrated against M+N- reagent cells as the patient had anti-N+'N'.

Results: The anti-'N' titre remained <32 during pregnancy. The delivery sample provided a result of 32.

As no bleeding risk was identified, no red cell units were cross-matched for delivery. In case of haemorrhage, ABO and D compatible, RhK phenotype matched units were advised, with IVIg and steroids to mitigate haemolysis. In a non-emergency situation, frozen N- S-s- U- red cell units were available.

The patient delivered at 41 weeks gestation by an uncomplicated vaginal delivery with minimal blood loss, requiring no transfusion support. The baby had no clinical evidence of HDFN and a negative direct agglutination test.

Discussion: This case shows that although the anti-'N' titre rose to a potentially clinically significant level of 32 by the end of the pregnancy, no clinical evidence of HDFN was present in the newborn.

The value of multiple disciplinary teams from cross organisations is demonstrated for developing pregnancy management plans when there is little published evidence relating to clinical significance of rare antibodies.

PO51 | A closed loop audit of pre-operative transfusion samples in orthopaedic patients at a major trauma centre

Dr Tony Feng[1,2], Ms Rea Thomson[2], Ms Kathryn Greenslade[1], Mr Ross Medine[2], Dr Jennifer Easterbrook[2], Mr Calum Arthur[1], Mrs Matilda Powell-Bowns[1]

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Introduction: There are clear guidelines on taking group and screen samples (G&S) for elective arthroplasty and major trauma. However there is limited guidance on blood grouping for other trauma patients. The purpose of this study was to review the level of blood grouping at a major trauma centre and validate a protocol that limits the expensive processing of G&S samples.

Methods: After reviewing the national guidance on transfusion samples in orthopaedic patients, data was prospectively collected for all orthopaedic admissions in the Royal Infirmary of Edinburgh between January and February 2023. The cause of admission, number of G&S samples processed on arrival and need for red cells was collected using the hospital blood bank. A new protocol was devised based on a multidisciplinary meeting which limited the requirement for G&S

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samples only to presentations in "category X", including neck-of-femur fractures (NOFs), pelvic fractures and major trauma. A re-audit was completed between April and May after departmental education and institution of this protocol.

Results: 759 patients were admitted under orthopaedics in the major trauma centre across two separate months. 47% of patients were admitted with presentations falling in category X (354/759) and patients in this category accounted for 88% (92/104) of those requiring post-operative red cell transfusions. Of these, 51% were attributed to NOFs (47/92). In the initial audit, 54% of trauma patients out with category X had samples sent (124/230), estimated to cost £3800. Of these 230 patients, 3% required post-operative transfusions (7/230). In the re-audit, 23% of patients out with category X had samples sent (40/175), estimated to cost £1400, of which 3% (5/175) required transfusions. None of the transfusions in these patients in either audit were related to their operation and the protocol achieved an estimated cost saving of £2400 over one month.

Conclusion: This study highlights the importance of sending samples for patients with certain categories of orthopaedic trauma (category X) due to the high demand for post-operative transfusions. However, the absence of transfusion requirements in other presentations suggests over-testing. While implementation of the new protocol has markedly reduced over-testing, additional interventions are required to reduce this further.

PO52 | Case studies: Misleading serology of patients on anti-CD38

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Introduction: Anti-CD38 is a therapeutic monoclonal antibody (TMAb) used to treat Multiple Myeloma (MM). CD38 antigens are present on myeloma cells and are found in lower levels on the surface of red blood cells (RBC), causing pan-reactivity in standard testing. DTT (Dithiothreitol) treatment of reagent panel cells disrupts the disulfide bonds of CD38, allowing exclusion of alloantibodies.

Presented are two cases where the TMAb history was not provided prior to serology testing.

Method: Two new cases were received by Red Cell Immunohaematology (RCI) for antibody investigation. Clinical details provided were knee replacement (case one) and no information (case two).

Routine investigations (ABO and D group, RhK phenotype, Indirect Antiglobulin Test (IAT) and enzyme IAT antibody panels) were performed.

Results: For both cases, IAT and enzyme IAT were pan-reactive. The auto control and DAT were negative. These results could indicate the presence of an antibody against a high frequency antigen.

Known rare red cell phenotypes was tested against the patients' plasma by IAT. Both provided positive results (3+) with all reagent cells except the Lu(a-b-) cell and cord cells. Concerns were raised that the patients had developed an anti-Lub, a rare antibody with limited antigen negative RBC unit availability.

Case One:

Patient was attending Hospital A for surgery. RCI contacted Hospital B where they were informed the patient was under their Haematology team and had commenced anti-CD38 therapy 14 months earlier.

Case Two:

RCI contacted the referring HTL, who later provided an update from their clinical team that the patient was on anti-CD38.

The presence of alloantibodies was excluded by testing against a DTT treated standard antibody panel.

Conclusions: Lu(a-b-) and cord red cells have weakened expression of CD38 antigen and are often negative when tested against the plasma of patients on anti-CD38. Both cases highlight how important awareness of the patient's TMAb history is to ensure appropriate testing and prompt resolution. The success of TMAbs means an increased number of patients receiving this type of therapy and the development of new drugs which may affect transfusion testing. Clinical teams must keep HTL updated with which patients are implicated.

PO53 | Transfusion reaction investigation–Is a targeted approach effective?

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Acute transfusion reactions are varied, but can generally be categorised into mild, moderate and severe; allergic/anaphylactic, haemolytic, respiratory, febrile. Historically, in our organisation all transfusion reactions were reported to the transfusion laboratory and investigated by repeat pre-transfusion testing and microbiological testing of implicated components. Following the BSH guideline in 2012 a move towards a targeted approach to investigations was initiated. A flow chart guiding the clinical team in differentiating mild transfusion reactions from moderate or severe, and suggesting relevant investigations was initiated in 2017. In 2020 the laboratory investigation form was updated to promote the targeted approach. In 2022 the transfusion reaction order sets on the electronic patient record system was enforced with all moderate/severe reactions discussed with a haematologist. Orders sets include default tests appropriate for the reactions type, including pathology and imaging.

This review looked at the effectiveness and efficiency of a targeted approach between 2020 and 2022.

A total number of 22 transfusion reactions were investigated between 2020 and 2022. Inappropriate investigations were reduced by 40%. Inappropriate investigations of mild reactions were reduced from 5 in 2020 and 2021 to 0 in 2022. Appropriate investigations being missed were reduced from 5 in 2021 to 0 in 2022. Instances where no clear outcome was recorded for the patient and no advice on subsequent transfusion reduced from 30% in 2020, 37.5% in 2021 to 0% in 2022.

Laboratories face challenges with staff recruitment and retention. It is important to ensure that all testing is appropriate and necessary. Unnecessary repeated pre-compatibility testing for all suspected acute transfusion reaction can be avoided using a targeted approach

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to investigation. Flow chart have enabled clinical and laboratory teams to identify patients with mild transfusion reactions, without need for haematologist involvement, that can continue to receive transfusion with appropriate support. Haematologist input in moderate/severe reactions ensure that appropriate order sets are used. Default order sets support standard practice ensuring all appropriate testing is completed based on specialist advice. This approach has reduced the number of unnecessary laboratory investigations, improved identification of clear outcomes for the clinicians and has proved to be effective and efficient.

PO54 | Rare blood is not a safety blanket

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Introduction: Rare blood is defined as negative for high prevalence red blood cell (RBC) antigens, a donor frequency of <1 in 1000 or negative for multiple more common antigens rarely found together[1]. Meeting requirements for rare RBC provision is a challenge for blood establishments[2]. Anxiety from clinical teams can lead to a tendency to request RBCs in advance, for example, for delivery of pregnancy or surgical intervention, even when bleeding risk is low. Should major haemorrhage occur, advanced provision of rare RBCs is unlikely to be an advantage, as unit numbers that can be provided are usually low and better used for top-up once bleeding is controlled[3]. Here we present three cases where rare RBC units provided in advance were not transfused to the designated patient.

Method: Retrospective review of case files was performed to identify rare blood provision. Contact was made with the hospital to understand unit fate.

Results: Case 1 = Jsb negative; 2 units – non-urgent surgery, no Maximum Surgical Blood Ordering Schedule (MSBOS) requirement for RBC support. Units transfused to another patient without rare RBC requirement.

Case 2 = U negative; 2 units – non-urgent surgery, MSBOS requirement = 4 units. Blood service not informed in advance to allow multidisciplinary team (MDT) planning. Units transfused to another patient without rare RBC requirement.

Case 3 = H negative; 2 units – delivery of pregnancy, advanced planning in place, bleeding risk considered low, frozen thawed units provided, not transfused but discarded.

Conclusion: Patients with a potential rare RBC requirement need an MDT approach to allow advanced planning to evaluate:

- Bleeding risk
- The role of patient blood management strategies, to mitigate need for transfusion
- RBC stock levels
- If donor call-up or the provision of frozen/thawed RBC units is required
- 'Plan B' blood selection advice if rare units are not available

Rare blood should not be ordered in advance by default, but usually reserved for confirmed requirement post-procedure. Even in the face of major haemorrhage, rare units can be provided once bleeding is under control for patient top-up.

PO55 | One size doesn't fit all–Mapping of the journey related to the transfusion science higher specialist scientific training

Dr Matthew Hazell[1], Nicola Wilkes[1], Laura Eastwood[1], Dr Tom Bullock[1], Dr Samantha Reynolds[2], Alex Hogan[1], Alison Muir[3], Mandy O'Shea[4], Josephine McCullagh[5], Chloe George[6], Shane Grimsley[1], Sara Wright[1]

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Introduction: Higher Specialist Scientific Training (HSST) is a five-year work-based programme of bespoke training for Specialist Biomedical Scientists and Clinical Scientists to become eligible to apply for Consultant Clinical Scientist posts[1]. Since the introduction of the programme, many cohorts have started training to Consultant level. For Transfusion Science, the key milestones needing to be completed for successful exit of the course are:

- A Post-Graduate Diploma (PGDip) in Management and Leadership in Healthcare
- Royal College of Pathology Exams – FRCPath Part I and II
- Professional Doctorate (DClinSci) or other approved project related to the profession
- Onefile portfolio completion aligned to the National School of Healthcare Sciences good scientific practice standards

Training is self-led through job planning with the trainee's employer and tailored to their needs. Through the survey of current and past HSSTs in Transfusion Science, we illustrate how each journey is unique.

Methods: Miro, an online collaborative whiteboard was used to create a canvas that allowed mapping of training journeys for Members of the Multi-Organisational TraNsfusIon HSST SuppOrt NetwoRk (MONITOR) ($n = 12$).

Results: Key milestones in training were completed across a range of time points in the programme:

- PGDip in Management and Leadership in Healthcare was completed between years 2 and 4

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- FRCPath Part I completion ranged between year 1 and 4
- FRCPath Part II completion ranged between year 3 and 5
- DClinSci completed at year 5 (study started in either year 2 or 3)
- Onefile portfolio completed in year 5 (addition of evidence takes place across the entirety of HSST)

Conclusion: Starting the HSST can be an overwhelming experience. This is due to the perception related to the scale of the elements of the programme to be completed. Throughout, a trainee can feel like they are falling behind as their peers achieve key milestones. Here, we have demonstrated that the HSST in Transfusion Science is not a one size fits all training programme, but confirmed that each trainee's journey was unique. This is important for the understanding and wellbeing of future cohorts that are embarking on the training.

PO55 | RCI assist app: A national referral algorithm and transfusion education resource

Mrs Helen Thom[1], Mr Alex Hogan[1], Mr Gary Cavanagh[1], Mr Mawa Sall[1], Mrs Tracey Watson[1], Mrs Dianne Armstrong[1], Mr Robert Lees[1], Mrs Kimberley Garnett[2], Mrs Doris Lam[1], Mrs Akua Nyarko Marfo[1], Mrs Patricia Richards[3], Mrs Julia Lancut[3], Mrs Louise Sherliker[1], Mr Wisdom Musabaike[1], Mrs Laura Hontoria Del Hoyo[1]
[1]NHSBT, United Kingdom, [2]Path Links Pathology Network, United Kingdom, [3]East and Southeast London Pathology Partnership, United Kingdom

Introduction: Transfusion 2024 outlined the need for a pathway between Hospital Transfusion Laboratories (HTL) and NHSBT that defines decision points for further serological investigation, improves hospital staff capability, provides faster patient results and transfusion support, whilst enabling a reduction in costs.

There were 179 delayed transfusions reported to SHOT in 2021. RCI Assist was developed to support and guide HTL staff, standardising work performed on samples before referral to RCI, and aiding in-house resolution. The algorithm contains referral points at which a remote referral to RCI could be made; sending analyser results for interpretation instead of a sample for serological investigation. Remote referrals avoid the duplication of work, while providing reassurance to HTL staff regarding appropriate blood provision, reducing waiting times for results and transfusions.

A 2020 pilot between Newcastle upon Tyne Hospitals NHS Foundation Trust (NUTH) and RCI Newcastle identified 10% of referred cases as remote referrals, of which 80% were concluded without the need to refer a sample to RCI. Further pilots are being rolled out in 2023 across Path Links Pathology Network supported by RCI Barnsley, and East and Southeast London Pathology Partnership supported by RCI Tooting.

Methods: A retrospective review of 1329 reference referrals for ten pilot sites was undertaken to identify at which point samples would have been referred if using RCI Assist. The number of potential remote referrals was calculated. Prospective data will be captured during the pilots.

Results: The review identified 14% of reference referrals could potentially be concluded remotely. This number varies between 7 and 25% across HTLs in the two regions, the lower numbers where HTL staff are exposed to complex serology.

Discussion: Approximately 52,000 reference samples were referred to NHSBT RCI in 2022–2023. Based on the retrospective data analysis, around 7000 reference investigations could be concluded remotely.

RCI Assist has the potential to improve patient safety and the outcomes for those requiring transfusion by aiding HTL decision-making, saving time and resources. The supporting information will improve staff confidence, particularly in settings where complex serology is not routine.

PO57 | Pilot of a practice learning experience for adult field student nurses across donor and patient services in NHS national services Scotland, Scottish national blood transfusion service

Mrs susan cottrell[1], Moira Anderson[1], Neil Healy[1], Sandra McLachlan[1], Dianne Hagart[1], Jennifer Poulton[1], Catherine Purton[1], Angela Smith[1], Andy King-Venables[1], Julie Robertson[1], Calum Thomson[1], Ejiro Scott[1], Emma Trotter[2], Sam Abdulla[2], Helen Scott[3], Gillian Taylor[3], Christina Eyres-Young[4], David Lamont[5]
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A strategic improvement approach by NHS National Services Scotland (NSS) Scottish National Blood Transfusion Service (SNBTS) Donor and Patient Services enabled a pilot of an undergraduate practice learning experience (UGPLE) for adult field student nurses in the east region. This was undertaken as part of National work to introduce student practice learning experiences into Scotland's National Boards to maximise student practice learning capacity. In partnership with Edinburgh Napier University (ENU) and NHS Lothian (NHSL) a project management methodology was applied. This included a timetable of learning across donor collection, clinical apheresis, tissue, cells and advanced therapeutics and the transfusion team. Appropriate governance was in place between partners. The project was governed internally by a steering group with a project group being responsible for the operational delivery. The initial pilot was delivered over an eight-week period, commencing w/b 4 February–8 April 2022. Cohorts two and three were a six-week placement between the periods of 12 September–21 October 2022 and 16 January–24 February 2023 respectively.

Evaluation was obtained via Lime survey and Microsoft forms from four staff groups by rating on a Likert type scale of 1 – 5 (where 1 is strongly disagree and 5 is strongly agree): undergraduate students, practice assessors (PA) and supervisors (PS), support staff in each service and the Practice Education Facilitator (PEF). A total of four of the five (80%) students provided detailed evaluation prior and during the PLE as well as PA and PS support.

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Overall evaluation:

1. Student 100% ($n = 4/4$) scoring >3, 90% being scored as 5.
2. PA and PS ($n = 12/16$) >3 (75%), with 66% ($n = 10/16$) scoring 5
3. Support staff, 82% ($n = 9/11$) of staff scoring >3
4. PEF ($n = 1/1$) scoring 100% >3, with 73% ($n = 8/11$) of all questions scored as 5

The overall evaluation is extremely positive and a valuable learning experience. The pilot demonstrates the visibility of a nursing career within SNBTS working in specialist roles, aligned to the NSS/SNBTS workforce strategy. Recommendations for improvements have been considered, with additional resource required to support the provision of UGPLE and on-board multiple NHS/Higher Education Institute partners.

PO58 | Non-scoring pre-transfusion testing (PTT) EQA samples–Why you shouldn't be afraid of a strange result

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UK NEQAS BTLP exercises contain samples which are intended for performance monitoring of critical blood transfusion tests. Scores are assigned for incorrect results and form the basis on which performance is assessed. Occasionally the material gives unexpected results, anomalous results, or deteriorates sufficiently that it is unfair to use for performance monitoring and the relevant tests are removed from scoring. In these circumstances, careful deliberation takes place to decide suitability for scoring, and whether any learning points can be made. For some exercises, material which cannot be scored is deliberately prepared because of the educational value it can provide.

Six years of exercise plans and reports were analysed. Affected test types, issue with material and any changes to scoring were recorded, together with any educational points made.

Sixty exercises were examined; 14 contained 21 affected tests.

Eight grouping samples were affected; three had mixed-field forward groups, three positive direct antiglobulin tests potentially affecting D typing, and two weak reverse groups. All were intentional and scored as planned.

Eight antibody identification samples were affected. Two contained antibodies which degraded during the exercises (one anti-D, one anti-s) so were scored for neither screening nor identification. The remaining six contained clinically significant antibodies and additional unexpected antibodies (three a non-specific enzyme reactive antibody, two anti-Wra, and one anti-Cw); provided the significant antibodies were recorded, no penalty points were assigned.

Four crossmatches were affected; all were removed from scoring. Two involved plasma contaminated with an additional antibody and one where the antibody degraded. There was one planned anomaly which offered an inappropriate donor unit for the patient demographic provided.

One Kidd phenotyping sample had scores reduced by half due to >20% of laboratories obtaining incorrect results. This was a driver in the development of the Extended Phenotyping programme.

Specific learning points were made for 15/21 samples, UK NEQAS BTLP took away actions from 18/21 samples.

Although the primary responsibility of the EQA provider is performance monitoring of individual laboratories, a significant other role is in providing educational opportunities. As with clinical samples, EQA samples producing unusual or anomalous results can provide excellent learning opportunities.

PO59 | Implementing rapid change to the NHS blood and transplant donor carer induction programme, whilst integrating education and training facilitators to the nursing and care quality team, through compassionate leadership

Ms Sarah Heal[1], Ms Mary-Ann Waters[1]
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An accelerated Donor Carer (DC) induction programme was implemented during September 2022, because of a blood stocks crisis in England, leading to an Amber Alert. Trained DCs were needed at pace to collect blood products to meet patient demand. The standard 6-week DC programme was condensed into 4-weeks. This required recruitment of experienced DCs into band 4 Education and Training Facilitator (ETF) roles. ETFs provide supernumerary, on-session practical training for up to three learners on a training bed; enabling a high-quality immersive learning experience, without impeding the operation of Blood Donation teams to fulfil their collection targets.

As ETFs were expected to work remotely across the West region, this required a level of autonomy that most had not experienced before. A gap analysis identified development needs, which led to a bespoke training day to maximise best practice. Emphasis was placed on developing softer communication skills to strengthen relationships within the regional Nursing and Care Quality team, and developing new relationships with collection team managers.

Working proactively, Regional Lead Nurses' (RLNs) optimised availability of ETFs across the region to ensure effective deployment to areas with high DC recruitment. This led to ETFs travelling extensive distances and staying away from home for prolonged periods, impacting on personal wellbeing. RLNs engaged Training Practice Supervisors (TPSs) to reinforce support and implemented regular one-to-ones, weekly wellbeing check-ins and monthly face-to-face meetings. This support network enabled greater flexibility within the team, which positively impacted on a greater number of learners being supported by ETFs.

Results showed a significant improvement in programme completion outcomes. Of 24 learners on the standard programme, 44% completed on time; whereas 59 learners on the accelerated programme showed 80% completing on time. Qualitative feedback from managers and learners indicated a higher level of satisfaction with the training on the accelerated programme.

The success of this programme was achieved by the flexibility and collaboration of the ETFs and TPSs underpinned by compassionate leadership of the RLNs to inspire and coach the team to achieve their full potential.

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PO60 | Co-visualising the impact of sickle cell: How can we use design thinking to investigate and visualise the impact of sickle cell?

Ms Mary Adeturinmo[1], Professor Ashley Hall, Anna Wojdecka
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This study leverages the principles of design thinking and system thinking to investigate and visualise the impact of Sickle Cell. Sickle cell is a genetic disorder that affects millions of people worldwide and disproportionately affects people of African and Caribbean descent. Patients with this condition face a range of physical, emotional and social challenges due to the unpredictable nature of the disease. The fundamental principle explored in this study is designing for empathy.

This design research project aims to investigate and visualise the condition's impact from a multi-stakeholder perspective by developing innovative Sickle Cell mobile exhibitions. Techniques from social constructionism, phenomenological qualitative research and user-experience research were utilised to create a novel methodology for this small-scale study. The methodology involved a multistep process combining the double diamond, system thinking and action research frameworks to gather insights that guided the development of this design research practice. I conducted semi-structured interviews with Sickle Cell Patients, a healthcare provider and support staff to understand their experiences of the condition's impact and identify common themes.

The findings from these interviews informed the development of a range of workshops and prototypes. The prototypes were tested with Sickle Cell patients and healthcare designers, who provided feedback on the concept. The results showed that the design outputs and exhibition were well-received and had the potential to improve awareness of the condition and promote empathy. Design research in healthcare has the potential to create innovative solutions. With the use of a multidisciplinary approach, it can yield a positive impact.

The project highlights the importance of design and system thinking in developing innovative healthcare solutions for this complex health condition. The study demonstrates the value of a multi-stakeholder approach to designing for empathy. It shows the potential of visualising the impact of Sickle Cell to promote understanding and awareness of the condition. To facilitate the further advancement of the concepts developed in this study, it will be necessary to undertake additional research endeavours and secure additional funding, given that the current study was conducted on a limited scale.

PO61 | Allo or auto antibody? Pre-stem cell/bone marrow transplant RhK phenotypes may aid management of complex serology cases

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Introduction: To increase the chance of successful engraftment in stem cell/bone marrow transplants, HLA matching between donor and recipient is prioritised over red blood cell groups. Donor and recipient's ABO groups are tested before transplant to guide transfusion requirements. Extended Rh and K phenotypes are not routinely tested.

This case study illustrates why RhK phenotyping donors and recipients prior to stem cell/bone marrow transplant may be advantageous.

Method: A 70-year-old female, with a history of bone marrow transplant 10 years previously, presented with Hb 52 g/L. The patient historically grouped as A Pos and donor O Neg. No other phenotypes were available.

Results on presentation:

- Group O in the forward group, anti-B only in the back group.
- Mixed field reactions in the D group, but not recently transfused.
- Direct antiglobulin test (DAT) strongly positive.
- Pan reactive autoantibody, non-specific reactions detected in the adsorbed plasma.

Two group O rr K- red cells were transfused. The patient's Hb was 85 g/L post transfusion. A repeat sample for crossmatch was taken seven days later.

Results: Anti-c was detected in the adsorbed plasma and the DAT remained positive. It was not possible to determine if the anti-c was allo or auto specificity as the patient was post-transplant and recently transfused.

To minimise clinical risk, one unit of group O r'r' K- red cells was issued as the patient's Hb had dropped to 71 g/L. These units are rare, <0.01% of the UK donor population. Transfusion was avoided by utilising patient blood management measures (PBM).

DNA samples from the donor and the recipient (pre and post-transplant) were tested and results available after 2 weeks. Both donor and recipient were predicted to be c+. Group O rr K- units were recommended for future transfusions.

Conclusion: This case study highlights that pre-transplant Rh and K phenotype results can provide useful information for patient's with complex serology. The information can support timely clinical decision making and potentially avoid the unnecessary use of rare red cell units. The Rh and K phenotype test is simple to perform and could be included as part of routine testing in this scenario.

PO62 | Signed off and then what? The role of competency-assessment in SHOT laboratory errors 2017–2022

Mrs Victoria Tuckley, Mrs Nicola Swarbrick, Ms Deborah Poles, Dr Shruthi Narayan
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Introduction: Effective training and competency-assessment (CA) forms a key safety barrier in laboratory practice and are also a

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requirement of the Blood Safety and Quality Regulations (2005). Despite this, errors persist.

Methods: Data on laboratory errors from SHOT, the UK haemovigilance scheme, 2017–2022 was reviewed in relation to CA of the individual who made the primary error and the outcome of the error.

Results: Overall, 1491 laboratory errors in the categories incorrect blood component transfused-wrong component transfused (IBCT-WCT), IBCT-specific requirements not met (IBCT-SRNM) and anti-D immunoglobin (Ig) errors were reviewed. Data on CA for the procedure was available in 930/1491 (62.4%) reports. Data on whether the CA was in date was available in 279/473 (59.0%) IBCT-WCT and IBCT-SRNM reports from 2020 to 2022.

In total 870/930 (93.5%) individuals who made the primary error were competency-assessed and 256/279 (91.8%) of the assessments were in date. The highest proportion of individuals who were not competency-assessed occurred in anti-D Ig errors 17/190 (8.9%), and the highest number in IBCT-SRNM 34/513 (6.6%).

Where the individual was competency-assessed 473/870 (54.4%) noted environmental or task contributory factors and 365/870 (42.0%) noted organisational or workload contributory factors during incident investigation.

Conclusion: These data are incomplete as nearly 40% of respondents did not provide answers regarding CA. However, they do demonstrate that CA alone is not an effective barrier to prevent errors in transfusion. SHOT data 2010–2016 show 70% laboratory staff involved in errors had undertaken competency assessment and there have been no significant changes. CA captures one snapshot in time and often only evaluates the responses to pre-arranged questions. Assessments should consider non-routine situations, limitations and where to look for further information as suggested in the SHOT UPTAKE model (Narayan et al., 2020). Furthermore, a person may have the knowledge required in hypothetical scenarios, but human factors such as distractions, poor working environment, stress, fatigue and assumptions may hinder their ability to practically implement this knowledge.

PO63 | Transfusion 2024–What is required to support clinical transfusion and reduce variation in practice? An exploration

Ms Wendy Mcsporran[1], Dr Suzy Morton[1], Ms Louise Sherliker[1]
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Introduction: Despite the provision of education resources, variation in transfusion practice and poor adoption of guidelines remains a problem (1). The Transfusion 2024 (T2024) strategic plan outlines key priorities for clinical and laboratory transfusion practice to enable safe patient care across the NHS. One recommendation defines the need to improve education to ensure patients receive safe appropriate transfusions.

The question therefore arose; what was required to address variation in practice and what support, or education would be beneficial?

Method: A mixed methodology approach was undertaken, comprising three main areas of work; a compilation of existing educational resources, stakeholder feedback on educational requirements and the mapping of career pathways with education requirements. Finally, the key discoveries were reviewed and analysed by a T2024 workgroup who triangulated the data and reached a consensus for informing the future development of clinical transfusion support.

Results: Directory of current educational resources

Over a hundred courses and resources were identified, with a wide range of formats including taught courses, e-learning, bookmarks, factsheets, webinars, podcasts and MSc courses. Leading to further analysis – if there are so many resources what is affecting uptake and implementation?

The educational journey – mapping career pathways

Key discoveries included but were not limited to:-

Non- career transfusion staff are highly reliant for their education from mandatory training, this is developed at trust level and not standardised.

There is an opportunity for further collaboration between national bodies and trusts to develop competency frameworks to accompany educational programmes to enable a skilled workforce.

Transfusion practitioners are key to developing/influencing training and competence within trusts but have neither a framework mandating education or competence for the role.

Stakeholder engagement

Key themes included:-

Transfusion education remains a low priority within trusts.

The resource for transfusion education in trusts remains small in comparison to the number of professionals requiring clinical advice, education, and training. Teams also reported working without consultant support.

Conclusion: Opportunities to provide further support to clinical transfusion teams were identified and projects proposed to optimise education of all involved in transfusion. NHSBT T2024 programme is developing a strategy to take this work forward.

Theme: Patient blood management

PO64 | The all wales transfusion record: A re-design for life-saving best practice

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Introduction: The All Wales Transfusion Record (AWTR) is the standardised national documentation which has been used for over 10 years to record the written instruction for, and administration of, blood component transfusion in Wales. At the end of 2021 a scheduled review of the AWTR was undertaken to ensure it remains fit for purpose.

Method: To inform this review an audit of use of the existing AWTR in practice was conducted to identify any wide-spread or significant non-compliances with regards to completion, to evaluate 'usability'.

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A survey of AWTR users (both authorisers of blood transfusion and administrators) and other stakeholders was then undertaken to canvas opinion on the current content and structure (including process flow, clarity and unnecessary information required), and proposed changes under consideration.

Thirdly, transfusion records from other parts of the UK were acquired to offer insight into how this document is formatted elsewhere.

Results: It was concluded from these exercises that an important key aspect of this revision would be to introduce direct accessibility to additional supporting material.

A draft of the AWTR was produced and circulated to the stakeholders for comment, and then following further amendments was presented to the Blood Health National Oversight Group of Wales for approval.

Key changes in the revised AWTR were:

- Inclusion of a field for patient weight,
- Expanded section on consent, to accommodate the SaBTO 2020 recommendations[1],
- Expanded section on transfusion associated circulatory overload (TACO) risk assessment,
- Inclusion of a field for reason for transfusion/ National Blood Transfusion Committee of England (NBTC) indication code for each unit authorised,
- Inclusion of a QR code links to: 'Receiving a blood transfusion' patient information leaflet, SHOT (Serious Hazards of Transfusion) TACO checklist, and NBTC indication codes.

A set of education and information resources were developed alongside this to facilitate introduction of the into use.

Discussion: The new version of the AWTR now incorporates a more clear and robust emphasis on consent, identification/ reduction of TACO, and appropriate use of blood component transfusion, utilising new technology to support and inform best practice.

PO65 | Improving the availability of Ro red cells for Ro patients–A pilot study of sharing Ro units between two trusts

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Introduction: Sickle cell disease patients with Ro phenotype should be transfused with Ro red cells. However, a discrepancy exists between demand (10% increase each year) and supply, with only 50% demand fulfilled by the current donor base. Consequently, Ro patients often receive substitutions (e.g., rr) which risks alloimmunisation.

Once issued to hospitals, unused Ro units cannot be returned to NHSBT for redistribution, thus further impacting the availability of these units. A recent audit assessing the outcome of Ro units in five London hospitals showed that 27% of unused units were transfused to non-Ro patients.

Sharing unused Ro units between hospitals could address this by increasing the opportunities for transfusion to Ro patients and by reducing the need to order Ro units from NHSBT. While local agreements exist for sharing Ro units between hospitals within the same Trust, there is no established system for sharing Ro units between different Trusts.

To test this concept, we therefore initiated an eight week pilot study of sharing Ro units between two hospitals in different Trusts in North West London.

Method: This was a collaboration between NHSBT, Hammersmith Hospital (NWLP, ICHNT) and Northwick Park Hospital (TDL, LNWH). Between 14/12/2022 and 8/2/2023, unused Ro units identified at either hospital were offered to the other site for transfusion to Ro patients. Courier costs between sites were covered by NHSBT.

Results: 450 Ro units in total were transfused at Hammersmith Hospital. They transferred 51 unused Ro units to Northwick Park Hospital; 44 (86%) were transfused to Ro patients, 7 (14%) were transfused to non-Ro patients. Cold chain requirements and agreed transfer turn-around-times were all met.

Conclusion: This pilot study shows that sharing Ro units between hospitals within different Trusts is feasible and safe. It offers a cost-effective means to improve Ro supply given the relatively low costs of couriers compared to new donor recruitment. This concept should be utilised alongside donor recruitment drives to improve the availability of Ro units for Ro patients. Project expansion to other hospitals within London is planned to incorporate all the largest users of Ro units in England.

PO66 | The impact of sex on peri-operative blood transfusion trends in contemporary cardiac surgical practice

Mr Marcus Taylor[1], Ms Nadine Soliman[1], Dr Calum Downes[1], Mr Danial Ghafoor[1], Mr Ioannis Ioannou[1], Miss Jean Ling Tan[1], Mr Oluwatobi Adegboye[1], Dr Tim Hayes[1]

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Introduction: Up to half of all patients undergoing cardiac surgery require peri-operative blood transfusion (POBT), with female patients recognised as a particularly high-risk subgroup. The aim of this study was to examine the impact of sex on transfusion practice in cardiac surgery.

Method: A retrospective database of consecutive patients undergoing isolated coronary artery bypass grafting (CABG) or aortic valve replacement or mitral valve repair/replacement between September 2017 and December 2019 in a single UK cardiac surgery centre was analysed. Primary outcomes were the incidence of POBT (defined as

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receiving a blood transfusion during surgery or within the first 72 h after surgery) and in-hospital mortality. Appropriate statistical tests were used to compare outcomes between groups.

Results: A total of 729 patients were included in the study. The mean age was 66.5 years (±11.0) and 40.2% ($n = 293$) were female. In-hospital mortality was 2.3% ($n = 17$) and the incidence of POBT was 29.6% ($n = 216$). The rate of pre-operative anaemia was similar between females and males (30.0% vs. 25.5%, $p = 0.174$). POBT was significantly higher for females compared to males (52.2% vs. 14.4%, $p < 0.001$). This trend was upheld in non-anaemic patients (42.0% vs. 9.8%, $p < 0.001$) and anaemic patients (76.1 vs. 27.9%, $p < 0.001$). Mean starting Hb (125.7 vs. 137.4 g/L), Hct (0.38 vs. 0.41 L/L) and body surface area (1.78 vs. 2.02 m^2) were all significantly lower for female patients (all p values <0.001).

Conclusion: Results from this study show that female patients experience significantly higher rates of POBT, regardless of starting Hb. Features known to be associated with POBT such as low Hb, Hct and BSA were all significantly lower in the female cohort in this dataset. Finally, a transfusion rate of 27.9% in non-anaemic females suggests that current patient blood management guidelines may not be suitable for contemporary cardiac surgical practice.

PO67 | Development and internal validation of a clinical prediction model to predict peri-operative blood transfusion in patients undergoing cardiac surgery

Mr Marcus Taylor[1], Ms Nadine Soliman[1], Dr Calum Downes[1], Mr Danial Ghafoor[1], Mr Ioannis Ioannou[1], Mr Jean Ling Tan[1], Mr Oluwatobi Adegboye[1], Dr Tim Hayes[1]

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Introduction: Studies show that up to half of all patients undergoing cardiac surgery require blood transfusion, with certain patient groups recognised as being at particularly high or low risk of requiring a peri-operative transfusion. However, blood remains a precious resource and hence a "one size fits all" approach to pre-operative patient blood management has implications for unnecessary wastage of products. The aim of this study was to develop and internally validate a model to predict the need for peri-operative blood transfusion in patients undergoing cardiac surgery.

Method: A retrospective database of consecutive patients undergoing isolated coronary artery bypass grafting (CABG) or aortic valve replacement or mitral valve repair/replacement between September 2017 and December 2019 in a single UK centre was used to develop a multivariable logistic risk prediction model, with bootstrap sampling used for internal validation. Measures of discrimination (area under receiving operator characteristic curve [AUC]) and calibration (observed to expected [O:E] ratio) were assessed as measures of model performance.

Results: A total of 729 patients were included in the study. The mean age was 66.5 years (±11.0) and 67.6% ($n = 493$) underwent isolated CABG. The mean Hb immediately prior to surgery was 132.7 g/L (±14.8) and 27.3% ($n = 199$) of patients were anaemic at the time of undergoing surgery. The incidence of peri-operative transfusion was 29.6% ($n = 216$). In-hospital mortality was 2.3% ($n = 17$). Predictors included in the final model were age, female sex, isolated CABG, body surface area and HbXHct. Model performance was excellent, with an AUC (adjusted for in-sample optimism) of 0.83 (95% confidence interval 0.80–0.86) and an O:E ratio of 0.99 ($p = 0.864$).

Conclusion: This contemporary dataset with a peri-operative transfusion rate of approximately 30% has been used to produce a model comprised of a small number of routinely collected clinical variables. Model performance after internal validation was promising. Further external validation studies are required to determine if the model is suitable for use in wider clinical practice.

PO68 | Long term support of transfusion dependent patients by the national frozen blood bank

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Introduction: The National Frozen Blood Bank (NFBB) at NHS Blood and Transplant in Liverpool is a national facility for the processing, extended frozen storage and issue of rare red cells. It stocks over 1000 donations with 40+ different rare phenotypes. 10% of stock is assigned reservation status for named patients, primarily patients with Sickle Cell Disease (SCD). This case study aims to review key aspects of long term support of these patients by NFBB.

Method: To identify a case where the reservation process was utilised and investigate details including phenotype, donor numbers, stock numbers, issued unit numbers, duration of reservation and clinical feedback.

Results: One SCD patient with phenotype Js(b-) was chosen owing to the number of units and duration of NFBB support. From reservation status assignation in June 2022 to end of April 2023, twenty units were frozen and reserved for this patient, donor call-up was instigated on 3 occasions to build stock. 13 frozen units had already been issued prior to reservation status being applied. The 33 units covered 15 transfusion episodes. Clinical feedback indicates that all units except 1 (damaged at hospital) were transfused. All requests to the NFBB were for immediate preparation. There are 23 active donors who meet the full criteria for the patient.

The number of units requested for each episode ranged from 1 to 4, with 2 requested on 10/15 occasions.

Liquid units were sent with frozen/thawed ($n = 1$, $n = 2$) on 2 occasions.

The average duration of frozen storage for the 20 reserved units was 37.7 days, ranging from 1 to 94 days with a median of 32 days and mode of 22 days.

Conclusion: This case has proven the importance of actively sourcing, freezing and reserving donations for patients with high transfusion

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dependency. The utilisation rate of issued units in this clinical context was very high. Learning points are that we cannot rely on liquid inventory alone for such cases. Therefore, adequate frozen unit storage must be maintained and improved upon for future cases. Continued case investigation and the introduction of target stock algorithms based on demand data may inform improved stock management.

PO69 | Working towards improved management of red blood cell stocks to better support patients with a rare red cell requirement

Dr Matthew Hazell[1], Vanessa Winfield[1], Shane Grimsley[2], Dr Tom Bullock[1], Ellen Tayamen[1], Laura Eastwood[1], Alex Hogan[1], Izza Ahmed[1], Doris Lam[1], Dr Kamala Gurung[1], Dr Tracy Hui[1], Justin Thorogood[3], Kathryn Tulley[2], Kirk Beard[3], Julia Mahmood[1], Craig Wilkes[4], Richard Turner[3], Clare Bray[3], Andy Perry[3]
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Introduction: OBOS facilitates communication of the Hospital Transfusion Laboratory's Red Blood Cell (RBC) unit stock order requirements with NHS Blood and Transplant's Hospital Services Team[1]. Where available, RBC units are provided so long as there is no conflict with current stock management rules. On occasion, this can result with the issue of more rare RBC units for patients without such a requirement e.g. extended phenotype stock where the patient has not been sensitised to the related RBC phenotype. A risk was identified that current stock management rules could reduce availability of rare RBC stock for patients with clinically significant alloantibodies. This risk led to a multi-disciplinary event to understand and improve the current process.

Methods: Data gathering of orders requesting for Fy (a-, b-) or three antigen negative specification (not including Rh and K phenotype) was performed. Information collected was date bled, date issued, date transfused, transfused to a patient with RBC alloantibodies that met an antigen negative order requirement.

An online (Miro) A3 problem solving event was undertaken to identify the process current state, risk score related inappropriate issue of rare RBC stocks and root cause of the problem. Solutions were identified, and risk score reassessed.

Results: Less than 40% of the units ordered with a specific RBC antigen requirement were issued for transfusion of a patient with matching RBC alloantibodies.

Process mapping identified a 16-step process from hospital order to RBC unit issue. Risk score with current control measures = 28/80. Six steps were identified as root causes for an increased risk for the inappropriate issue of rare RBC stocks. Twelve solutions were identified to reduce the process risk score to 21/80, these included:

- Software changes
- Updates to process and related documentation
- Education of staff
- Check of order request with NHSBT Laboratory and Clinical staff
- Improved visual management
- New storage locations of units
- Improvements to NHSBT phenotyping and genotyping reports

Conclusion: The current process of RBC stock issue has a risk of inappropriate issue of more rare units. Here we have identified future solutions to be tested to reduce this risk.

PO70 | Audit of platelet transfusion practise for haematology patients in Wales, 2022

Ms Elisabeth Davies[1], Ms Deborah Underwood[1], Mrs Stephanie Ditcham[1], Mrs Lee Wong[1], Dr Edwin Massey[1], Dr Rhian Fuge[1]
[1]Blood Health National Oversight Group (BHNOG)

Introduction: Platelet transfusions are prescribed for the prevention and treatment of haemorrhage in patients with thrombocytopaenia and/or functional platelet defects, either from primary clinical causes such as haematological disorders causing hypoproliferative thrombocytopenia, or as consequence of therapeutic measures for example, chemotherapy, inhibitors of platelet function.

Method: The audit sought to review the current practice for platelet transfusion across Wales to assess compliance with BSH standards, for platelet use (1).

The audit was conducted over a two-week period in November 2022, with representation requested from all Health Boards in Wales. Patients over the age of sixteen with haematological disorders only were included in this data.

Results were reported as a percentage against each of the following standards:

Platelet Standard 1: In patients with a reversible cause for bone marrow failure and no other risk factors for bleeding, the threshold for prophylaxis is a platelet count of 10×10^9 /L

Platelet Standard 2: When platelets are prescribed for prophylactic use, this should not be more than one adult therapeutic dose

Platelet Standard 3: Patients with chronic bone marrow failure are not routinely given prophylactic platelet transfusions

Platelet Standard 4: Prior to procedure, if no additional risk factors are present, the appropriate threshold for platelet count is as stated in the BSH platelet guideline

Platelet Standard 5: Patients do not require platelet transfusion prior to bone marrow biopsy

Results: A total of 85 platelet transfusion records were returned from all Health Boards (HBs) apart from one across Wales.

(i) Compliance to standards:

Standard 1–76%

Standard 2–91%

Standard 3–100%

Standard 4–100%

Standard 5–100%

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(ii) All Wales bench marking: Comparison with previous all Wales audits (2) shows an improvement in all standards except standard 1.

Conclusions: Results from this audit show a continued improvement on the BHNOG audit performed in 2020 and NCA UK data from 2017. Reassuringly, there was a low rate of inappropriate orders in the haematology / oncology setting.

PO71 | Many happy returns: A machine learning-based allocation policy to support platelet waste reduction in hospital blood banks

Mr Joseph Farrington[1], Dr Kezhi Li[1], Dr Wai Keong Wong[3], Dr Samah Alimam[4], Mr Ian Longair[2], Professor Martin Utley[1]
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Introduction: Reducing platelet wastage in hospital blood banks remains an important challenge, with outdating rates up to 20% commonly reported. Applications of machine learning to platelet inventory management have focused on replenishment orders, and it is common to use an OUFO (oldest-unit first-out) allocation policy when deciding which unit of platelets to issue to meet demand. This allocation policy may not be optimal if, as in our partner hospital, approximately 10% of issued platelets are returned to the hospital blood bank unused. We propose a novel, machine learning-guided allocation policy: issue the youngest unit if a model predicts it will not be transfused and the oldest unit otherwise. With a sufficiently good predictive model this policy should increase the likelihood that, if a unit is returned, it can be reissued to another patient before it expires.

Methods: We modelled a hospital blood bank managing platelets using a Markov decision process, and simulated the impact of our proposed allocation policy for different assumed levels of predictive model sensitivity and specificity. We subsequently trained an XGBoost supervised learning model to predict whether a requested unit would be transfused based on two years of data including requesting specialty, patient location and platelet count.

Results: Our simulation studies identified the target region of sensitivity and specificity required for the novel policy to outperform an OUFO allocation policy in terms of wastage and shortages. Our proof-of-concept predictive model performed within this region resulting in approximately a third less wastage due to outdating in a modelled scenario based on our partner hospital data. The novel policy was particularly beneficial in modelled scenarios where a higher proportion of requested units were not transfused and where units had a shorter remaining useful life on delivery to the hospital.

Conclusion: Our findings suggest that a machine learning-based allocation policy can support efforts to reduce platelet wastage. It may be possible to improve the model performance by including additional features, such as diagnoses and planned procedures, and our simulation results suggest that a better predictive model could further reduce wastage.

PO72 | 2023 national comparative re-audit of NICE quality standard QS138

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Introduction: NICE has developed Quality Standard 138 (QS138), covering general principles of blood transfusion. This re-audit evaluates compliance with the four quality statements of QS138 following the initial feedback given to sites after the first audit cycle in 2021, with the aims of:

- Allowing sites to evaluate local evidence of improvement in compliance with NICE QS138 following any implemented changes in practice.
- Provide data to hospital teams to allow understanding of what steps can be taken to implement Patient Blood Management (PBM) and measure its effectiveness in improving patient care
- Allow the transfusion community to benchmark the progress of PBM and improvements in patient care

Methods: All UK Trusts were invited to take part in the audit. Each participating site audited up to 40 patients. Standards were derived from the QS138 statements. Data were collected on cases during January to March 2023.

Results: Final data submission still ongoing. Interim analysis shows:

- 140 sites contributed data (153 in 2021)
- Data currently available on 1542 patients (4679 in 2021)
- 241/424 (57%) of patients known to have iron deficiency anaemia prior to admission for surgery were treated with iron before surgery (59% in 2021)
- 387/571 (68%) patients undergoing surgery with expected moderate blood loss received tranexamic acid (67.5% in 2021)
- 296/476 (62%) patients receiving elective red blood cell transfusions had both their Hb checked and a clinical reassessment after a unit of red cells was transfused (893/1534 (58%) in 2021)
- Only 185/525 (35%) received both written and verbal information about the risks, benefits and alternatives to transfusion (26% in 2021)

Discussion: The audit found continued compliance with QS138, but little to no improvement from the previous audit cycle. There was and remains opportunities to improve patient care, with the potential to reduce length of stay and reduce costs, as well as protecting the blood supply by reducing unnecessary use of red blood cells.

Sites should continue to monitor and improve their compliance with QS138 where possible (including iron treatment and TXA use). Local

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audit, such as use of the ongoing QS138 Quality Insights benchmarking audit tool may help sites to facilitate further improvements.

PO73 | Testing haemoglobin thresholds below 70g/L: A feasibility randomised controlled trial of red cell transfusion thresholds in paediatric haematopoietic stem cell transplantation (RePAST)

Dr Helen V New[1], Dr Simon J Stanworth[1,2,3], Emily, L Sanderson[1], V Hopkins[1], H Thomas[1], L Smith[1], A Gassas[4], M Adams[5], L Hoole[6], H Smethurst[1], M Lobo-Clarke[1], A Mora[1], On behalf of RePAST Collaborators

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Introduction: There is uncertainty about safety of haemoglobin thresholds for red cell (RBC) transfusion below 70 g/L, and optimal RBC transfusion practice in paediatric haematopoietic stem cell transplant (HSCT). A previous pilot study in paediatric HSCT was stopped due to increased veno-occlusive disease (VOD) in the liberal transfused arm (Robitaille et al, 2013). In view of lack of evidence in paediatric HSCT, we conducted a feasibility randomised trial comparing restrictive (Hb ≤65 g/L) versus liberal (Hb ≤80 g/L) thresholds for RBC transfusion (ISRCTN 17438123).

Methods: Children (≥1 to <18 years) undergoing allogeneic HSCT were recruited at UK paediatric transplant centres. Patient exclusions were haemoglobinopathies, RBC aplasia. The transfusion study protocol applied from HSCT Day 0 to 100. The two primary outcomes were: proportion of eligible patients recruited (target at least 50%); adherence to protocol for each Hb measurement. Secondary outcomes included: mean pre-transfusion, post-transfusion, overall Hb levels; measures of adherence; clinical outcomes potentially related to anaemia (e.g., frequency of clinically significant bleeds); adverse events (e.g., VOD); health-related Quality of Life, with inpatient daily fatigue score.

Results: 34 patients were recruited from 4 centres over 20 months. 48.5% of 70 eligible patients were randomised. Baseline characteristics were generally well matched: most children received myeloablative transplants, although more in the restrictive vs liberal arm had underlying diagnosis of acute myeloid leukaemia (58.8% vs. 11.8%). Study feasibility was also assessed on protocol adherence (predefined), with strong evidence (p-values <0.0001) that overall adherence in each arm was not lower than 70%: adherence (n/N (%) [95% CI]) in the restrictive and liberal arms was 961/969 (99.2%) [98.6, 99.7] and 1131/1164 (97.2) [96.2, 98.1] respectively. Patients received 65 RBC transfusions in the restrictive vs 94 in the liberal arm. Mean (SD) pre-transfusion Hb (g/L) up to day 100 was 63.8 (6.2) restrictive versus 80.1 (13.6) liberal arm. SAE rates reported between arms were similar (11 restrictive, 13 liberal).

Conclusions: For the primary outcomes, measures of adherence were well within pre-defined criteria although recruitment rate was just below target. There were no safety concerns. The findings support further study of haemoglobin thresholds below 70 g/L.

PO74 | Perioperative anaemia pathway in wales revisited–The next steps to achieving implementation

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Introduction: An All-Wales Perioperative Anaemia Pathway was developed and agreed by Health Board stakeholders across Wales. The guidance, issued via the Blood Health National Oversight Group (1) (BHNOG) in 2021, promotes patient blood management by reducing variation in preoperative anaemia management through screening and treatment of modifiable causes of anaemia with anticipated reduction in avoidable transfusions (2). In 2022, Velindre University NHS Trust and BHNOG secured funding from Value Based Health Care (VBHC) for a 2-year programme to support anaemia pathway implementation. The VBHC anaemia team was established in March 2023, with the initial objective to establish current hospital baseline activity, allowing benchmarking against the national pathway.

Methods: The following activities were performed to provide insight of preoperative anaemia management across Health Boards:

- Identify stakeholders including pre-op assessment nurses, pharmacy, VBHC leads and patient engagement.
- Hospital site visits/interviews with key stakeholders
- Work with Digital Health Care Wales (DHCW) to extract baseline data as defined by Commissioning for Quality and Innovation (CQUIN) standards (3).

Results: The All-Wales Perioperative Pathway states 'Any patients >18 years should be screened for anaemia if undergoing surgery with a possible blood loss >500 mL and a transfusion risk of 10%' (1). DHCW data identified 11,000 patients who fit CQUIN standards, 11% of these did not receive a preoperative haemoglobin of which 85% were scheduled for orthopaedic surgery. Of the patients who received a preoperative haemoglobin, 56% did not receive a ferritin and 71% did not receive a transferrin saturation test.

During site visits clinical staff highlighted three recurring issues preventing pathway implementation:

1. Logistics of blood test timing hindering timely patient review, preventing same day treatment
2. Training/skillset of staff to prescribe/administer IV iron

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3. Limited working with primary care, preventing full utilisation of oral iron.

Conclusion: Preoperative management of complex conditions such as anaemia is challenging. This work has identified outliers in terms of anaemia screening. Next steps are:

- A national stakeholder meeting to explore barriers, demonstrate baseline data, and find a standardised approach to improve data capture.
- Develop key performance indicators to monitor performance trends in anaemia management and use of blood.

PO75 | Perioperative implications of sickle cell disease in neurosurgery and the use of automated red cell exchange as an essential tool to facilitate time sensitive surgery

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Introduction: Patients with Sickle Cell Disease (SCD) requiring urgent neurosurgery present a clinical and logistical challenge. Two cases highlight the importance of peri-operative optimisation with automated red cell exchange (RCE) in the neurosurgical setting to avoid the potentially devastating post op sequalae if left untreated.

Case 1

Patient A, a 21-year-old female, presented with subarachnoid haemorrhage (SAH) requiring urgent craniotomy and clipping. Scarce documentation regarding the diagnosis and previous management, non-compliance with treatment and suboptimal management resulted in a HbS of 84%, placing this patient at high risk of stroke and venous thrombosis. Rebleeding risk following SAH increases with time so urgent RCE was essential to facilitate timely surgery and reduce these risks. Close liaison with NHS Blood and Transplant allowed RCE within 19 h of admission and surgery conducted with 34 h. Automated RCE allows for more rapid and precise reduction in HbS compared to manual RCE but is more labour intensive and local availability varies. Following RCE the patient had uneventful surgery and recovered fully.

Case 2

Patient B, a 65-year-old female, required urgent endoscopic endonasal debulking for a pituitary macroadenoma. HbSC (with an elevated HbF level) was found incidentally, despite the patient not fitting criteria for pre-operative screening. Cavernous sinus invasion along with untreated HbSC with a high Hb placed this patient at high risk of central thrombotic events. Urgent liaison with the specialist haemoglobinopathy team allowed confirmation of the diagnosis, clinical review and organisation of an automated RCE prior to surgery. It rare for a patient of this age to be unaware of her diagnosis and to have no history of sickle related complications. Surgery was postponed allowing for RCE and surgery was subsequently carried out without complication.

Discussion: Excellent co-ordination between anaesthetists, surgeons, haematologists and apheresis specialists is vital for peri-operative diagnosis and management of SCD and essential for good post-operative outcomes. Automated RCE has a vital role in neurosurgery as it reduces the perioperative risk of stroke and thromboembolism and allows for a rapid and precise reduction in HbS, facilitating time sensitive surgery.

PO76 | Electronic autologous cell salvage device connectivity–A two centre experience

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Autologous intra-operative cell salvage (ICS) provides safe, cost-effective reduction of allogeneic red cell usage and supports surgery where transfusion is not an option. ICS is recommended for patients with expected high blood loss during surgery[1]. Records are traditionally paper-based, presenting challenges with monitoring. In 2018 a pilot for ICS connectivity was presented at BBTS2 providing a valuable tool in patient blood management, with 54% reduction in staff time. Contemporaneous data on allogeneic and autologous blood usage within a single system, improves data capture reliability. In 2020, hospital A connected 7 ICS devices (Haemonetics Elite+) a further two were added in 2022. In 2022 3 obstetric ICS machines were connected at hospital B, with plans to connect remaining 11 devices within 6-months. Device data automatically transfers to electronic blood management system (Haemonetics BloodTrack).

This review explores the use and benefits of ICS-connectivity at two hospitals. Automated reports in excel enable analysis of service use, including blood volumes collected/reinfused and use of allogeneic components.

From 2020 to 2022, 3167 ICS events were performed at hospital A, mostly within obstetrics (37.3%), spinal (15.9%) and revision hip (15.4%). It was found that the total volume of reinfused ICS equated to 3900 units of allogeneic red cells.

Number of ICS events increased with a spike in used being noted in October and November 2022 coinciding with the national blood shortage.

999 allogeneic red cell units were given to ICS patients, the majority in revision hip surgery (250), vascular (184) and trauma (108).

Hospital B recorded 747 ICS procedures total blood loss 308,646 mL, 54,404 mL was reinfused. 32% of patients had autologous reinfusion.

ICS connectivity provides efficient data collection, incorporating multiple devices with minimal staff input. Electronic data output supports multi-user accessibility and versatile monitoring according to demand. The system is now in place in 2 hospitals where benefits have been realised including staff efficiency savings, ability to combine

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autologous and allogeneic component usage in a single database, peer review, monitoring and feedback. Machine event data enables identification of operator support/training and device monitoring. Accessibility of data during blood shortage supported blood conservation through increased ICS at both sites.

PO77 | The role of patient blood management in promoting safe, effective blood transfusion in Scotland

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Introduction: Patient Blood Management (PBM) is an umbrella statement for best transfusion practice while employing a range of PBM modalities such as

- anaemia management
- Intra Operative Cell Salvage
- Restrictive transfusion

It can be further defined as a "multidisciplinary, evidence-based approach to optimising the care of patients who might need a transfusion" putting the patient at the centre of decisions made.
Management support from all levels within the health board and a coordinated approach from the multi disciplinary team are integral to a successful PBM programme.
The Scottish National Blood Transfusion Service (SNBTS) actively supports PBM with measures such as the following–education, developing patient information leaflets/animations or working with the other devolved countries in developing best practice recommendations such as for "consent in transfusion", while also encouraging health boards to utilise all PBM modalities relevant to their need.
Method: To better understand what PBM measures are being used in Scotland the SNBTS transfusion team undertook a GAP analysis using the Nice Guideline (NG24) Blood Transfusion as their bench mark, resulting in a comprehensive questionnaire centred on the recommendations.
This questionnaire was sent out to all 16 Transfusion Practitioners around Scotland for completion by end of April 2023.
Results: All 16 Transfusion Practitioners completed the questionnaire, and data from 59 hospitals was analysed.
The initial data highlighted the following–48% of hospitals don't follow up iron interventions, 44% of Biomedical Scientists challenge transfusion requests, 63% of hospitals promote single unit transfusions, approximately 40% of hospitals have adopted an anaemia pathway, 54% of hospitals had no guidance for the use of Erythropoietin with 25% of hospitals having a policy for restrictive transfusion.
Conclusion: Our initial findings suggest that collaborations with national groups would support areas in PBM where improvements are required. This would also allow the data to be analysed further with a targeted approach taken.

PO78 | Audit of emergency components max red cell life in satellite fridges

Mrs Sapna Sharma[1]
[1]St. Mary's Hospital, London, United Kingdom

Introduction: St Marys Hospital hosts a number of high users of blood including trauma and maternity.
Between these two specialities we have 4 satellite fridges for emergency stock. In response to blood supply challenges and appeals to reduce max life requests for group O we wanted to assess our usage of this precious resource.
Method: Review of two month's storage history data of emergency red cells kept in satellite fridges A&E, Labour and Lindo (private) wing. Data is categorised by

- Blood group: O Positive or O Negative
- Component type: adult or Paediatric pack
- Date units are moved into satellite fridges
- Unit expiry date
- Date of transfusion (if used).
- For units which have not been used, the date unit was returned to stock or disposed

Results: In A+E 48/56 units were transfused within an average of 8 day, 3/56 expired and 1 unit returned to the lab. Whereas in Labour ward only 6/10 units were transfused, 2 returned to the lab. All 4 paedipack units were returned to the lab, 2/4 had expired. In the Lindo wing all 4 adult units were returned to laboratory, 1/4 had expired and all 4 paedipacks returned to laboratory 2/4 had expired.
Conclusion: Max life red cells is not needed to be stocked in A/E fridge. Paedipack stock in Lindo wing and Labour needs to be reviewed as this is not being transfused.

PO79 | SNBTS transfusion team: Celebrating 20 years supporting safe and appropriate clinical transfusion practice in Scotland

Mrs susan cottrell[1], Katherine Forrester[1], Julie Robertson[1], Laura Fraser[1], Jennet Getty[1], Bryan Beattie[1]
[1]NHS National Services Scotland/SNBTS, Edinburgh, United Kingdom

For twenty years the SNBTS Transfusion Team (TT, formerly Better Blood Transfusion) has been dedicated to promoting safe and appropriate transfusion for patients in Scotland. Operating across NHSScotland (NHSS), our multi-disciplinary team works collaboratively promoting practice improvement through a wide range of initiatives to meet our objectives:

- ensuring clinical transfusion practice is aligned to the patient safety agenda
- embracing evidence-based decision-making for individual patient care

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- leading clinical audit and continuous quality improvement (QI)
- adopting a "once for Scotland" approach to education and policy development
- embedding a haemovigilance culture across NHSS
- influencing the effective management of transfusion resources.

The TT education programme is learner-centred, meets the changing needs of multidisciplinary staff and is aligned to the digital learning agenda. Our audit/QI programmes utilise routine data and QI methods are aligned to Realistic Medicine principles. TT promotes appropriate patient care through Patient Blood Management initiatives including cell salvage and restrictive transfusion. Public and Patient Involvement, ensures the public benefit and patient voice are at the heart of everything we do. The TT network supports national incident management aligned to patient safety and promotes equity of practice, supporting service excellence and sustainability.

Red cell use per 1000 population in Scotland has reduced from 46.5 in 2003 to 22.0 in 2022. During this time TT achievements are many, notably:

- digital solution for safe transfusion practice education; LearnBloodTransfusion (UK and ROI collaboration)
- QI initiatives on O negative red cell stockholding and use, and transfusion in patients with iron deficiency anaemia
- world class clinical transfusion data mart
- national transfusion toolkit, including the National Transfusion Record and Policy
- transfusion-related Patient Information Leaflets for patients in Scotland and UK
- support of the UK haemovigilance system SHOT; embedding human factors into incident investigation.

We are thankful to staff across SNBTS, NHSS and wider, past and present, for their continued collaboration and support in promoting safe and appropriate transfusion. The TT network and strategy ensure the important work to improve clinical transfusion practice in the past twenty years will continue to deliver values based healthcare into the future.

PO80 | Selection of Orr red blood cells units on a patient with specificity not determined anti-c antibody

Ms Sara Costa[1], Mr Sam Sohrabian[1]
[1]NHS Blood and Transplant, London, United Kingdom

This case report highlights the diagnostic challenges and potential consequences of incorrectly phenotype of a patient with Rh(D) indeterminate status as R1r, leading to an erroneous interpretation of an alloantibody as an autoantibody.

The patient in question had recently received transfusions of red blood cells, which contributed to the confusion surrounding their Rh(D) status. As a result, the patient was transfused with Orr units based on the assumption that they were R1r and the presence of an anti-c antibody was considered autoantibody activity.

Subsequent genotyping investigations revealed that the anti-c antibody detected in the patient's serum was indeed an alloantibody targeting the Rh antigen system. Due to the unresolved patient's actual Rh(D) status and the presumed R1r phenotype, the transfused Orr units were effectively incompatible, which has caused an haemolytic transfusion reaction.

This discrepancy highlights the importance of accurate phenotyping as well as its careful interpretation, when Patients have recently received red blood cells units and the potential consequences of relying on incomplete or erroneous information.

In conclusion, this case emphasizes the significance of careful and accurate blood group phenotyping, particularly in patients with Rh(D) indeterminate status. It underscores the need for thorough investigations and proper interpretation of serological findings to ensure appropriate transfusion management. Improved communication between healthcare providers and transfusion services can help prevent similar errors and ensure the optimal care and safety of patients requiring blood transfusions.

PO81 | Management of platelet transfusion reactions within the northern centre for cancer care

Dr Laura Yeates[1], Dr Andrew Charlton
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Aims: We present a review of patients receiving platelet transfusions over a four month period within the Northern Centre for Cancer Care (NCCC) Newcastle and whether any supportive medication was required. We reviewed the medication given, the rationale for prescribing and the monitoring of any steroids given.

Methods: patients were identified by the transfusion team and a review of their electronic notes and prescriptions was performed.

Results: 121 patients required platelet transfusions throughout the 4 month period. A total of 19 patients (15.7%) received supportive medication alongside their transfusion. 16 of the 19 patients were given hydrocortisone with their transfusion on at least one occasion. 12 patients had a documented reason for the cover including review at time of reaction and documentation of reaction of a historic reaction. Only 5 patients receiving hydrocortisone had a blood glucose checked. 2 patients developed steroid related diabetes and 1 of these patients required admission to intensive care for intravenous insulin.

Discussion: BCSH blood transfusion task force guidelines highlight the limited evidence for pre medication with chlorphenamine and hydrocortisone, but recognises that there is minimal risk associated with chlorphenamine use. It recommends the use of paracetamol around half an hour to an hour prior to the transfusion. If there are further reactions the guideline suggests using washed products. Despite this guidance hydrocortisone is frequently used as a premedication for platelet transfusion. There was minimal monitoring of

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blood glucose levels for people receiving the hydrocortisone and only 1 had their HBA1c checked. This review did not look into other steroid toxicities including bone health, hypoadrenalism and infection.
Recommendations: All patients who are requiring cover should have medical assessment to include a detailed history of their previous reactions and severity. Decisions to supportive medication should be documented. Cover should routinely include paracetamol for mild fevers and chlorphenamine if allergy symptoms. If there are further allergy symptoms consideration should be given to trial washed components. Hydrocortisone should not routinely be given as prophylaxis for transfusion reaction. If there is a requirement for hydrocortisone due to acute reaction during symptoms a blood glucose level should be checked.

Theme: Quality, regulation and governance (including patient safety)

PO82 | Transfusion of blood products according to NICE guideline thresholds–A clinical audit in a district general hospital

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[1]*East Sussex Healthcare NHS Trust, Hastings, United Kingdom*

Introduction: The NHS Blood and Transplant Group released an amber alert in October 2022 for supply shortages of blood products in the United Kingdom. Following this the Royal College of Surgeons England issued guidance for blood transfusion thresholds, usage of tranexamic acid, and in managing anaemia in the perioperative pathway for surgical patients. Frequently surgical patients are transfused blood products unnecessarily above published thresholds resulting in significant cost, risk of avoidable adverse events, and unnecessary increased nursing and administrative time.
Aims: To audit adherence of transfusion of blood products against NICE guideline thresholds. To review if alternative methods to reduce transfusion burden, such as administration of iron or tranexamic acid, were considered.
Methods: We retrospectively audited all patients receiving a blood transfusion consecutively across a four-month period in a general surgery department at a district general hospital The medical notes for each patient were assessed for their pre-transfusion haemoglobin, indication for transfusion, and whether transfusion was prescribed according to NICE guidelines. Data was collected on whether intravenous iron or tranexamic acid were administered, whether iron studies were measured, and whether any adverse blood transfusion reactions occurred.
Results: A total of 112 units of packed red blood cells were given across 42 patients. 45 units (40.2%) were prescribed according to NICE guidance and a total of 2 self-limiting transfusion-related reactions (1.79%) occurred, both in patients transfused above guidance thresholds. Iron studies were measured in 30 patients (71.4%), 6 patients (5.36%) received iron transfusions, and 17 patients (40.5%) received tranexamic acid over their admission. At a raw cost of approximately £135 per unit of donated blood, this corresponded to an additional £9,045 over a four-month period (£27,135 pa), not including nursing and administration costs.
Conclusions: Stricter adherence to clear transfusion thresholds has scope to help reduce blood transfusions, complications and hospital costs. Our unit is currently establishing a better pathway to identify, investigate and treat anaemia earlier, to minimise intraoperative blood loss with tranexamic acid, and to reduce above-threshold blood transfusions.

PO83 | Serious hazards of transfusion (SHOT) 2021 key recommendations survey

Ms Emma Milser[1], Victoria Tuckley, Debbi Poles, Caryn Hughes, Nicola Swarbrick, Simon Carter-Graham, Shruthi Narayan
[1]*NHSBT, Manchester, United Kingdom*

Introduction: This survey was to assess progress with implementing the key recommendations published in the 2021 Annual SHOT Report (published July 2022).
Methods: An electronic survey was emailed to all UK registered SHOT reporters in February 2023, remaining open for 12 weeks. Reporters were asked to outline progress and challenges faced in implementation.
Results: A total of 51 responses were received representing England, Scotland and Wales.
Recommendation 1: Staff must ensure that they involve, engage and listen to patients as 'partners' in their own care, including transfusion support.
32/51(67.7%) had organisational systems and processes designed to be patient-centred. Policies for engaging patients, families and carers were implemented in 31/50(60.8%). In 37/51(72.5%) clinical staff were trained to listen to patients, use structured communication tools and involve patients in decision making. 33/51(64.7%) encourage patients to ask questions, and provide information relating to transfusion support.
Recommendation 2: Healthcare leaders must ensure that systems are designed to support safe transfusion practice and allocate adequate resources to support safe staffing levels, staff training in technical and non-technical skills; appropriate equipment, including IT equipment.
Clinical 17/51(38.6%) and 31/51(63.3%) laboratory areas had minimum staffing levels based on workload, acuity and complexity of work including absences. 14/51(32.6%) clinical and 25/51(50%) laboratory areas had difficulty providing time needed for staff training and competency-assessments.
Recommendation 3: All healthcare leaders must promote a just, learning safety culture with a collective, inclusive and compassionate leadership and help embed safety culture in teams.
38/51(78.6%) clinical and 46/51(90.2%) laboratory areas stated staff feel able to raise concerns and report errors. 39/51(76.5%) clinical and 46/51(90.2%) laboratory areas have policies promoting a just and learning culture.

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Conclusions: Barriers to implementing recommendations included suboptimal staffing levels, difficulty engaging clinical areas and communication challenges with organisational wide governance teams.
Survey response rate was lower than previously, therefore results may not be representative. Low response rates may reflect NHS pressures and siloed working. Understanding progress with implementing recommendations remains 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.

PO84 | Configuration of an electronic blood sample labelling system–Maximising safety benefits

Dr Karen Mead[1], Mrs Mooi Tay[1], Mr Tim Wreford-Bush[1], Mrs Halina Collingbourne[1], Pip Croxford[1], Mrs Emma Chambers[1]
[1]*North Bristol NHS Trust, Bristol, United Kingdom*

Introduction: The use of electronic systems to support blood transfusion processes is increasing and is recommended by several organisations due to the perceived benefits to patient safety, clinical documentation and regulatory requirements. Whilst these systems are widely promoted, individual Trust configuration can be very different and will have a huge impact on the actual safety benefits.
Method: A review of over 300 incident reports from 10+ years of Trust wrong blood in tube (WBIT) data was carried out. Recurring themes were identified within the reports and used to recognise stages within the process where measures can be taken to reduce risk.
Results: Using the WBIT data analysis, a list was produced of essential requirements expected from our Haemonetics BloodTrack electronic blood sample labelling (EBSL) system:

- The ability to print labels must be restricted to those staff in date with competency
- Individual user identity and activity must be logged each time the system is used
- A wristband barcode must be the only source of key patient identifiers accepted by the PDA
- A pre-sampling checklist must be completed on the PDA prior to taking the blood sample
- The checklist must include availability of a fully completed request, and core patient identifiers matching on wristband, request and verbally from patient
- The sample must only be taken once the checklist on the PDA is complete
- The patient wristband must be (re)scanned immediately prior to printing label
- Only one sticker must be generated during each sampling transaction
- Location where sample was taken must be clearly recorded on sample sticker

Following implementation of EBSL for inpatient areas in June 2022, no WBIT incidents have been identified to date. In contrast four WBITs have been identified within the same time-period from hand-labelled samples.
Conclusion: EBSL systems are being promoted nationally and many healthcare organisations are in the process of introducing such systems. However, careful planning and configuration is required to ensure maximal safety benefits and to encourage the user to follow the right process rather than allowing capacity for a wrong process to be carried out.

PO85 | Ten years of progress (or lack of) in sample labelling and wrong blood in tube: Insights from the national comparative audit of blood transfusion 2012 and 2022

Dr Catherine Booth[1,2], Terrie Perry[3], Caroline Lowe[3], Julie Jackson[4], Karen Mead[5], Karen Ward[6], Anna Capps-Jenner[7], Paul Davies[1]
[1]*NHS Blood and Transplant, United Kingdom,* [2]*Barts Health NHS Trust, London, United Kingdom,* [3]*Milton Keynes University Hospital NHS Trust, United Kingdom,* [4]*James Paget University Hospital Foundation Trust, United Kingdom,* [5]*North Bristol NHS Trust, United Kingdom,* [6]*Northumbria Specialist Emergency Care Hospital, United Kingdom,* [7]*Ealing Hospital, United Kingdom*

Introduction: Blood samples and requests for transfusion must be labelled with the patient's forename, surname, date of birth, unique identifying number, date/time of sampling and identification of the staff member taking the sample. Rejected samples risk harm when a patient has to be re-bled, suffers delay to transfusion or to a procedure. Electronic bedside systems which scan a barcode on the patient's wristband and generate a label at the time of sampling aim to reduce mislabelling and misidentification leading to wrong blood in tube (WBIT) errors.
Method: The 2022 National Comparative audit of sample collection invited all Trusts and independent hospitals in the United Kingdom to provide data on the number of transfusion samples rejected due to labelling errors and the number of WBIT incidents in one month (October 2022). It also asked whether sites had electronic systems to generate request forms and print labels at the patient's bedside. We compared these results to the 2012 audit.
Results: In 2022, 23,584 rejected samples were reported by 179 sites in 1 month. The rejection rate of 4.4% represents a 50% increase compared to 2012 (2.99%). Reported WBIT increased almost threefold (92 in 1 month compared to 99 in 3 months). Even allowing for the greater total number of samples in 2022, this is a 45% increased incidence.
23% of sites have capacity to print a sample label at the bedside, a threefold increase compared to 2012. The 4 sites using only electronic systems for both sample labels and request forms reported lower rejection rates compared to 21 sites with only hand-written methods: 2.3% versus 5.9%. However, sites with electronic systems continue to report WBIT.

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Conclusion: The increase in sample rejection rate likely reflects the generalised pressures facing clinical staff. Electronic systems may reduce labelling errors but must not be seen as a substitute for positive patient identification. Staff still need training in appropriate hand-labelling for areas or scenarios where electronic systems are not available. Transfusion teams must continually review how electronic systems are being used in practice as workarounds and short-cuts designed to save time can erode the safety benefits.

PO86 | Northern Ireland are so 'vein'; a unique opportunity for regional collaborative traceability.

Ms Diane Nelson[1], Mr Patrick Breen[1], Mr Andrew Patterson[1]
[1]*HSCNI, Belfast, United Kingdom*

Introduction: A unique opportunity for Northern Ireland presented itself as part of the regional pathology transformation programme in the form of one laboratory information management system (LIMS) across the province. To further build on this once in a lifetime chance was the capability to introduce a real 'vein to vein' electronic traceability system from blood donation to final fate for donations.

Method: The project team, since 2019, have been fully engaged with the Northern Ireland Blood Transfusion Service and Trust staff. This approach has proved vital for the project to work in collaboration with all involved; from those in administrative roles, through to clinical stakeholders (including biomedical scientists, nurses, haemovigilance practitioners and clinicians). The participation and feedback from everyone were crucial in the capture of the functional specification for the regional solution.

An extensive series of workshops were held to capture and refine the requirements as well as utilising Failure Mode and Effects Analysis (FMEA) as a structured approach to discovering potential failures that may exist within the scope of the design. This allowed everyone the opportunity to review, discuss requirements and agree the recommended statements to be captured. The project team also engaged with other UK Blood Transfusion Services to take lessons learned from their experiences. This ensured a robust quality and validation process to the requirements which were signed off by the group.

Results:

- Enhanced donor management including a web-based donor customer portal
- Online donor appointment booking and health check questionnaire
- Integration of blood production and blood tracking information flows across the region to enable electronic vein to vein tracking
- The availability of a single real time blood stock inventory across the region to reduce wastage and unnecessary transport
- Increased Safety and Quality
- Possible reduction in cold chain errors
- Possible reduction in SABRE and SHOT reports
- Possible reduce human errors and near misses

Conclusion: The project is currently in live procurement; using the requirements developed within the UK Government Model Services Contract to form the contract, which will be awarded in 2023 with an expected go live date in 2025.

PO87 | Delayed transfusions contribute to death (SHOT data 2014–2021)

Mr Simon Paul Carter-Graham[1], Dr Paula Bolton-Maggs[1], Ms Debbi Poles[1]
[1]*Serious Hazards of Transfusion (SHOT), Manchester, United Kingdom*

Introduction: Transfusion of blood components in the UK is generally safe but delayed transfusion can have severe consequences for the patient. Serious Hazards of Transfusion (SHOT) is the UK independent haemovigilance scheme. Reactions, errors and events related to transfusions of blood components are reported to SHOT using an electronic reporting system.

Methods: A retrospective analysis of delayed transfusions reported to SHOT 2014–2021 was performed to review factors contributing to delay-related deaths.

Results: There were 885 reports of delayed transfusions with death linked to the delay in 55/885 (6.2%). 36/55 deaths (65.5%) were considered to be 'possibly related' to the delay, 14/55 (25.5%) 'probably related' and 5/55 (9.0%) 'definitely related'.

When the transfusion was emergency or urgent the delay ranged from 15 minutes to 36 h, with a median of 3 h. In 9/55 (16.4%) cases the patient did not receive a transfusion when indicated.

15/55 (27.3%) occurred in emergency departments. The transfusion was an emergency in 29/55 (52.7%) of cases with 14/55 performed out-of-hours. Activation of the major haemorrhage protocol (MHP) was reported in 21/55 (38.2%). Gastrointestinal (GI) bleeding was implicated in 17/55 (30.9%). Many patients, 25/55 (45.5%), had multiple comorbidities and the majority were >60 years of age, 44/55 (80.0%).

Two important causes of delay were errors in MHP activation and delayed clinical decision-making 24/55 (43.6%). Communication failures between clinical and laboratory staff were reported in 42/55 (76.4%). Information technology problems contributed to 7/55 (12.7%) including 2/7 (28.6%) with pager failure.

Conclusions: Multiple reports (12) identified delays with MHP activation. Robust procedures need to be in place to prevent such delays. GI bleeding can be difficult to assess; prompt recognition and timely management is crucial. Poor communication continues to contribute to delays at all points of the transfusion pathway and delays are often cumulative. It is essential that communication from clinical staff is clear, concise, and provides all required patient information to the transfusion laboratory including the urgency of transfusion. Equipment (bleeps, pagers, printers) must be checked regularly to prevent faults contributing to delays.

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PO88 | A new approach for national internal vertical audits within the red cell immunohaematology department

Mrs Tess Winfield[1], Betty Wickens[1], Katie Cockayne[1], Ashleigh Joseph-Cox[1], Donna Blair[1]
[1]NHS Blood and Transplant, United Kingdom

Introduction: ISO15189:2012 14.4.5 states the laboratory shall conduct internal audits at planned intervals to determine whether all activities in the quality management system, including pre examination, examination and post examination, are implemented, effective, and maintained[1]. To maintain UKAS accreditation to ISO15189:2012 Red Cell Immunohaematology (RCI) was undertaking a process where external RCI auditors performed planned onsite full vertical audits. This process was impacted by the COVID-19 pandemic due to travel restriction. Pre-pandemic, the process caused disruption due to the number of auditors required on site. The lack of auditor resource and unexpected operational challenges made it difficult to deliver against the schedule. Here we describe a new risk-based approach.
Methods: To determine the requirements for a new audit process, a national review was performed to identify trends related to:

- Non-conformities from a full internal vertical audit cycle (12 months)
- Quality incidents (QI) and customer contacts

Results: Reviews identified the following trends:
Audit non-conformities:

1. Personal – Deficiencies in training records and process not followed
2. Documentation of examination processes – Deficiencies related to standard operating procedures (SOP)
3. Lab equipment reagents and consumable – Record keeping for example, temperature, return to service and goods inwards records

QI and customer contacts:

1. Crossmatching – Failure to follow process or meet customer requirement
2. Reporting errors – Incorrect demographics or reporting comments
3. Equipment – Breakdowns and delays

Trending allowed for the development of a rationale to pilot a hybrid approach to vertical audit. This involved three types of audits:

- Full vertical – Only performed if a significant change in process or if major QIs or trends identified.
- Witness – Where there was higher risk of adverse patient impact e.g. crossmatch; feto-maternal haemorrhage, antibody quantification
- Remote desktop – Document based issues for example, reports or SOPs

Audits were designed to be completed over the course of one month and targeted the same process, at all sites and were performed by local auditors.
Conclusion: The new approach to internal audit allowed for less disruption on site, development of local auditors, flexibility of delivery and a national evaluation of the process.

PO89 | Two to the rescue–Implementation of smaller transport boxes for major haemorrhage to reduce red cell wastage

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Background: University hospital Coventry and Warwickshire is a level 1 major trauma centre. Multiple internal audits over the years revealed that a significant proportion of O red cell units were wasted due to breach in cold chain of units sent in transport boxes to the clinical areas as part of major haemorrhage protocol (MHP).
As per our major haemorrhage protocol 4 units of red cells were sent at a time in a single transport box each time blood was requested by the clinical team. For red cells to be reused after an excursion from blood bank an uninterrupted cold chain should be maintained in a validated transport box. Most red cell units returned from MHP activation were wasted due to cold chain disruption each time the box was opened to obtain a single unit of red cells.
Methods: We proposed that sending 2 smaller transport boxes with two red cell units each will allow more unused red cell units to be returned to stock and therefore reduce wastage. After obtaining consent from the hospital transfusion committee and communication to all relevant areas, we conducted a trial of using 2 helapet smaller transport boxes as part of MHP packs.
Results: Over the 6-month period from October 2022 to March 2023 the trial demonstrated a considerable reduction in red cell wastage, saving 100 O red cells that would have otherwise been wasted.
O red cells returned to stock during the trial period
October 202212
November 202224
December 202212
January 202320
February 2023 14
March 2023 18
Discussion: Blood sent for MHP activations may safely be returned to stock if sent to blood bank within 4 h with the lid still sealed. Sending 4 emergency red cells in two smaller boxes for MHP reduced the number of red cells being wasted in the laboratory by almost 50%. Based on this simple yet effective trial the laboratory has decided to implement this strategy as part of its waste reduction measures.

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PO90 | Diffusion-limited oxygen release in human kidneys normothermically perfused with stored blood: Case for considering gas unloading kinetics from red blood cells

Dr Richard Dumbill, Ms Julija Rabcuka, Dr Simon Knight, Dr James Hunter, Dr John Fallon, Dr Daniel Voyce, Dr Jacob Barrett, Dr Matt Ellen, Dr Annemarie Weissenbacher, Mr Tetuko Kurniawan, Dr Slawomir Blonski, Professor Piotr Korczyk, Professor Rutger Ploeg, Professor Constantin Coussios, Professor Peter Friend, **Professor Pawel Swietach**[1]

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Introduction: A central dogma in physiology is that oxygen release at tissues is perfusion-limited, rather than diffusion-limited, because gas exchange at systemic capillaries is believed to be rapid. This assertion has influenced clinical care, which focuses on optimising oxygen delivery through improving blood flow and oxygen content, rather than oxygen unloading from red blood cells (RBCs). However, storage of blood causes profound changes in metabolism and cell shape which we determined to slow oxygen release from RBCs. We hypothesise that kinetic attrition of blood units can compromise tissue respiration, and hence transfusion outcomes.

Methods: We sought evidence for diffusion-limited oxygen delivery to tissues using transplant human kidneys normothermically perfused with stored blood. During perfusions, renal respiration was measured from blood gases, and RBCs were analysed for oxygen-unloading kinetics. Blood flow, pressure and resistance as well as urine production were monitored in real-time. Higher kidney perfusion is expected to increase glomerular filtration and the demand for tubular transport, and hence renal respiration. In a perfusion-limited system, we expect proportionality between arterial oxygen delivery and renal respiration, whereas a sublinear relationship is anticipated for a diffusion-limited scenario. This clinical trial was performed in accordance with the principles of the declaration of Helsinki, following approval by a national Research Ethics Committee (REC ref. 20/NW/0442) and the national Competent Authority (MHRA).

Results: We obtained 32 kidneys for perfusions with stored bloods, manifesting a range of oxygen unloading time constants. The measured renal respiratory rate did not correlate significantly with the standard definition of oxygen delivery based on blood flow and oxygen content, that is, perfusion-limited supply. However, a strong correlation was obtained after introducing a factor describing oxygen release from RBCs (Pearson's $R = +0.576$; $P = 0.00974$). We observed a significant negative correlation between RBC oxygen unloading kinetics and renal respiration (Pearson's $R = -0.535$; $P = 0.00234$). Our findings are consistent with diffusion-limited oxygen release in the kidney.

Conclusion: Oxygen release to tissues can become diffusion-limited with transfused blood. The kinetic quality of RBCs should therefore be considered in the context of transplant and transfusion medicine.

PO91 | Computer says no–Impact of component selection errors by the laboratory–Insights from SHOT

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Introduction: Component selection (CS) errors in the laboratory have wide-ranging effects from no harm to ABO-incompatible (ABOi) transfusions, being largely preventable.

Method: CS errors reported to SHOT (2017–2021) were analysed to identify critical points, preventative barriers and highlight learning.

Results: CS errors accounted for 362/2262 (16.0%) laboratory errors, impacting on 219 red cell, 69 plasma, 59 platelet, 11 anti-D Ig, and 4 granulocyte transfusions.

Errors resulted in 13 ABOi and 11 major morbidities due to development of anti-K in females of childbearing potential (CBP).

Most errors were reported in the incorrect blood component transfused (IBCT) categories of specific requirements not met (IBCT-SRNM) 173/362(47.8%) and wrong component transfused (IBCT-WCT) 155/362(42.8%).

IBCT-SRNM (173/362) included patients receiving 50 units of incorrect red cell phenotype, 28 K-positive red cells to females of CBP, 27 non-CMV-negative, 23 non-irradiated, 23 non-pathogen inactivated, 11 non-HLA-selected components, and 11 miscellaneous errors.

IBCT-WCT (155/362) included issue of 44 wrong component type, 44 wrong ABO/D to transplant patient, 29 D-mismatched, 13 ABOi, 11 adult units to neonates, 10 ABO-compatible with patient (but not as required), 2 incompatible crossmatches and 2 units to the wrong patient.

Non-IBCT laboratory errors (34/362) included 11 anti-D Ig errors, 10 delayed transfusion, 6 expired units transfused, 4 issuing errors, and 3 avoidable transfusions.

Laboratory information management systems (LIMS) were involved in 217/362(60.1%). These included 66 alerts ignored, 50 where available information not heeded (e.g., specific requirements, patient identification errors), 30 LIMS not updated to reflect requirement, 27 alert not available, 22 LIMS algorithm/rule issues, 7 input errors, 6 data migration/legacy issues, 5 alert misinterpretation and 4 IT downtime issues. 256/328(77.8%) stated staff involved with error were competency-assessed for the task.

Conclusion: Contributory factors included IT configuration issues, gaps in communication, training and knowledge, distractions, multitasking, insufficient staffing, and excessive workloads.

Sufficient knowledge and competency are essential to ensure correct CS, with IT in place to alert when requirements are not met. Alerts must be understandable, actionable and not easily overridden.

Use of exit checks prior to units leaving the laboratory and robust collection and administration checks will identify errors prior to transfusion and improve patient safety.

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PO92 | Using microsoft office forms to support infectious disease look back processes

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Introduction: Enhanced Hepatitis B virus (HBV) core antibody testing (anti-HBc) of blood donors within the UK was implemented in May 20221.

This has temporarily increased the number of recipients requiring tracing and testing as part of a lookback process.

Method: In Wales, previously infrequent lookback processes used a paper form which was both laborious and time consuming.

To improve the process an electronic lookback form was developed by the Welsh Blood Service (WBS) Blood Health Team (BHT) using Microsoft (MS) forms.

The logic feature in MS forms allows the creator to add a range of question types, guiding the user to the correct questions (using the branching feature) with rules to ensure they respond to a specific question before progressing; it also provides an audit trail of submitted data.

To comply with General Data Protection Regulations, as personal data was being collected, a user declaration was added to the lookback form to confirm that the information submitted was true and accurate.

The form was tested by the WBS and Health Board colleagues prior to use.

Results: As of May 2023 three donors have been identified as having occult HBV infection (OBI) via this enhanced testing process, donating a total of 160 components. 79 responses had been received confirming a record of the blood component being transfused/ discarded.

The information provided assurance that the recipients were managed appropriately.

Users have been able to complete lookbacks in a timely manner with responses being received instantly by the BHT, allowing real-time data analysis and ongoing reporting.

Conclusion: The BHT has introduced a robust system for capturing, compiling, and monitoring patient information safely and securely–a key requirement of our lookback process.

This system has now been adopted by other UK blood services.

MS forms is user-friendly and flexible, allowing the creator to adjust and make changes as appropriate. The process has a positive impact on NHS resources.

PO93 | An audit of automated red cell exchange transfusion procedures in Scotland over a 2 year period (2020–2022)

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Introduction: Patients with Sickle cell disease (SCD) in Scotland is increasing with a 79% increase in prevalence from the years 2014/2015 to 2020/2021 (Scottish Paediatric and Adult Haemoglobinopathy (SPAH) Network, 2023). Red cell exchange transfusion is a lifesaving treatment for patients with SCD. All hospitals involved in the care of SCD patients should have staff trained in manual exchange with referral centres having capability for automated exchange transfusion as per British Society of Haematology (BSH) guidelines.

The aim of this audit is to review the current Scottish practice in providing red cell exchange to patients with SCD and comparing to BSH standards. This audit reviewed; clinical reason for red cell exchange; the extent of red cell phenotyping undertaken prior to initiation of exchange transfusion and any exchange related complications.

Methods: Data was retrospectively collected between January-December 2022 from the National STAR Data programme and national Clinical Portal. Transfusion data was collected from the SNBTS LIMS, etraceline (Mak Systems).

Results: There were 19 patients in Scotland on regular exchange transfusion programmes during this period. Recurrent sickle cell crisis despite medical therapy was the most common reason for referral for exchange programme ($n = 6$). This was followed by stroke prophylaxis ($n = 5$), intolerance of hydroxycarbamide ($n = 4$) recurrent priapism ($n = 2$), and renal failure ($n = 2$). Regular exchange complications included alloimmunization ($n = 6$), and internal jugular thrombosis secondary to porta-cath ($n = 1$).

19 emergency red cell exchanges occurred in this period. Indications included acute chest crisis ($n = 13$), sickle cell crisis ($n = 5$), and priapism ($n = 1$).

Of patients on exchange programme 21 out of 22 patients had extended blood group phenotyping results on record.

Conclusion: This audit demonstrates that patients with SCD in Scotland are appropriately being exchanged in the acute setting and as part of a chronic transfusion programmes. Further study would be required to determine if all patients with indications for red cell exchange are being referred for this therapy.

The alloimmunisation rate among patients on exchange in this audit was 27%. Most patients (95%) had extended blood group phenotype data available. Further study would be required to assess the degree of phenotype matching in SCD patients receiving exchange.

PO94 | Introducing prothrombin complex concentrate (PCC) into the emergency department (ED) to reduce administration delay

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Introduction: Prothrombin Complex Concentrate (PCC) is a human blood product used as a first line treatment for reversal of the effects of Warfarin in life or limb threatening major bleeding; it also used for other direct anticoagulants and should be given within an hour of diagnosis. Recent data from Serious Hazards of Transfusion (SHOT) showed delays or omissions in administration can result in serious

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morbidity or death (Narayan S et al 2020). In January 2022, SHOT published a clinical alert through the NHS National Reporting and Learning System (NHS England, 2022) which identified delays in the administration of PCC.

An audit within Aneurin Bevan University Health Board identified similar delays to other studies (Bordelau et al., 2015) sometimes >14 h.

Methods: The Multidisciplinary Team (MDT) used a quality improvement (QI) process assessing through process maps, which highlighted delays around communication with the on-call haematologist and delays in the collection due to a complex ordering/collection procedure. To ensure legislative measures and timely administration a MDT approach was used including ED consultants, TP's, TLM, Haem Consultants, Porting and Pharmacy.

Results: PCC is now stored in the Omnicell (electronic drug cabinet with auditable access) within ED. A protocol to who can prescribe, and specific criteria for the release of PCC was established with an initially prescribed dose of 1000 international unit (IU) without haematology consultant approval, and 3000 IU (maximum one adult dose) stored for top up once haematology approval is sought.

Process measures have identified that administration within the first hour has improved from 35% to 63% and only two patients have had significant delays in the administration of PCC since the changes have been embedded five months ago.

Current results, comparing pre-implementation to post-implementation have shown a significant improvement in mortality of this group of patients from a survival rate of 64% to 93% in the first five months.

Discussion: Implementation of a quality improvement program has ensured rapid release of PCC within the ED and no incidents have currently been documented. Ongoing audit will review mortality, improvements to patient morbidity and timely administration of PCC.

PO95 | Improving blood bank and transfusion services through clinical audit–An experience from a low- or middle- income country (LMIC)

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Introduction: Our hospital is a tertiary care centre with four secondary hospitals. Blood bank located in main hospital provides services to main hospital and three secondary hospitals. The fourth centre (AKMCCC) in another city has its own blood bank and transfusion services under their local management. During the RCA of a sentinel event at AKMCCC, few non-conformances in blood bank were identified. So, the main blood bank was requested to do an audit of AKMCCC blood bank and transfusion services.

Methods: A transfusion medicine physician and manager from main blood bank visited the AKMCCC on December 13, 2022, and did audit by interviewing technologists and nurses, inspecting equipment and reviewing documents/records.

Results: Most of the work was being done as per SOPs provided by main blood bank. However, there were certain deficiencies. The staff was unaware of full utility of blood bank computerized information system. Donor area had no computer system installed. Backup devices for storage of blood products were not available. There was non-compliance in monitoring the temperature charts of blood refrigerators. Despite having centrifuge (Cryofuge) machine and other equipment, they were making only PRBCs from majority of the whole blood donations collected. There was no interfacing between infectious disease serology instrument and blood bank information system for automatic transfer of results, and results were being logged in system manually. Blood products were requested through handwritten paper slips as Computerized Physician order entry (CPOE) option was not available. Blood was being dispensed in a way that may cause wrong patient identification and blood was not being transported in temperature-controlled boxes.

Interventions: The lead blood bank technologist at AKMCCC visited main blood bank to observe practices and learn IT system. Serology instrument was interfaced with blood bank information system. A computer with access to blood bank information system was placed in donor area for logging donor interview. Provision of CPOE to clinicians, and arrangement of blood storage backup and blood transportation boxes is in process. Blood dispensing was modified to eliminate chances of wrong patient identification.

Conclusion: The undertaken audit proved effective in identifying and correcting blood bank practices.

PO96 | Red blood cell transfusion practices and outcomes in acute upper gastrointestinal bleeding: Insights from the 2022 UK audit

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[1]*UK National Upper GI Bleed Steering Group, United Kingdom*

Background: Current guidelines recommend a restrictive approach to red blood cell (RBC) transfusion in acute upper gastrointestinal bleeding (AUGIB) patients.[1] This study aimed to evaluate the association between early RBC transfusion, re-bleeding, and mortality in AUGIB patients.

Methods: Analysis of 3674 AUGIB patients from a prospective multicentre observational study of adults (≥16 years) who underwent inpatient endoscopy in UK hospitals. Patient data, including RBC transfusions, were collected, and relationship between early RBC transfusion, re-bleeding and mortality was assessed using logistic regression.

Results: Within 24 h of presentation, 41% of AUGIB patients received RBC transfusions, and among them, 46% had an initial haemoglobin level below 70 g/L. For patients with initial haemoglobin levels below

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70 g/L, the rates of re-bleeding were comparable between those who received early transfusion and those who did not (15% vs. 14.6%, $p = 0.9$), as were the mortality rates (10% vs. 9.5%, $p = 0.5$). However, in patients with initial haemoglobin levels above 70 g/L, early transfusion was associated with higher re-bleeding rates (13.4% vs. 5.9%, $p < 0.05$) and increased mortality rates (10.4% vs. 5.4%, $p < 0.05$) compared to those who did not receive early transfusion. After adjusting for the Glasgow-Blatchford score and initial haemoglobin levels, early transfusion was independently associated with a 56% increased risk of re-bleeding (odds ratio 1.56, 95% CI 1.18–2.08) and a 42% increased risk of mortality (odds ratio 1.42, 95% CI 1.04–1.93).

Conclusions: Despite current guidelines recommending a restrictive approach to RBC transfusion in AUGIB, a significant proportion of patients received early transfusions. Our findings highlight that early transfusion is associated with an elevated risk of re-bleeding and mortality, potentially due to liberal transfusion practices, similar to the results noted in a 2007 prospective multi-centre observational study.[2] This study underscores the importance of adhering to guidelines and adopting individualized transfusion strategies for AUGIB patients. The development of clinical decision support tools could help to optimize transfusion practice and improve clinical outcomes.

PO97 | The role of surveillance data in supporting the safe supply of blood, tissues, and organs, across the UK

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Background: Since 1995, the NHSBT/UKHSA Joint Epidemiology Unit has collected data on UK blood, tissue, and organ donors and recipients. There are nine schemes: three for infections in donors; one for outcomes of blood service investigations into potential transfusion transmitted infections (TTIs) for the Serious Hazards of Transfusion (SHOT); one for evidence of Creutzfeldt-Jakob disease (CJD) transfusion-transmission in collaboration with the National CJD Surveillance and Research Unit; two large-scale blood donor surveys for risk-associated behaviours; the Human T-cell Lymphotropic virus (HTLV) National Register for long-term follow up on disease progression for an asymptomatic cohort; and a protocol which collates horizon scanning data to risk assess emerging threats.

As an example, we describe the data types collected for blood donors and recipients, and how they support the UK blood services in making and monitoring changes to selection and testing policy.

Methods: The schemes combine testing and reactivity data from microbiological screening, confirmatory testing, and clinical history, demographics, infection source, behaviours, sexual partners, and compliance with donor selection policy for confirmed positive donors. The schemes are updated for changes to testing and selection.

Outputs and impact

Surveillance data show selection and testing policies as increasingly effective at minimising infections entering the supply. Since surveillance began, prevalent hepatitis C virus (HCV), and HIV markers in donations have declined to less than 2/100,000 per year. Incident hepatitis B virus (HBV), HCV and HIV has also declined, and residual risk of not detecting these viruses in donations has been estimated at less than 1/1 million for over 10 years. Very low numbers of reported and confirmed viral TTIs support this assessment.

Collaborations have combined epidemiological data with enhanced testing and behavioural data for greater insights and provided an evidence base for donor selection policy reviews giving more people the opportunity to donate blood without affecting the safety of the blood supply(1). Additionally, continuing surveillance shows no further evidence of variant CJD transfusion-transmission after leucodepletion. This informed a downward revision of risk leading to the 1998 ban on UK-sourced plasma for immunoglobulins being lifted in February 2021. Together these surveillance systems support wider public health measures.

PO98 | Impact of laboratory networks and mergers on transfusion practice–UKTLC survey

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In recent years, there is increasing consolidation, standardisation and transformation of existing pathology services in healthcare to create new ways of working aiming to improve quality and efficiency of pathology services. The outcome of network or merger is generally that laboratories align and under a single management system. Working practices, equipment and laboratory information management systems (LIMS) may be aligned as part of this process, although transition may be phased. In 2022 the UK Transfusion Laboratory Collaborative (UKTLC) distributed a survey to review transfusion practices, including questions relating to the impact of network and mergers.

A survey (OnLine surveys) was distributed to SHOT reporters, requesting one response per laboratory. Questions exploring impact of networks or mergers on staffing levels, recruitment/retention, workload, LIMS and cross-site record access, ability to provide specialist services, laboratory culture, resources, staff morale were included. Scores were recorded from 1 (negative impact) to 4 (positive impact). Results were analysed using Microsoft Excel. Scores 3 and 4 were regarded as positive, scores 1 and 2 as negative for analysis.

74 laboratories responded, a response rate of 49%. 15 responses from networks, most had transitioned more than 5 years ago (9/15, 60%), 5/15(33.3%) 2–5 years ago and 1/15(6.7%) < 2 years. 30 respondents were working towards a network. A positive impact was noted for workload (68.8%) and LIMS/cross-site record access (84.2%). A

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negative impact was reported for staff morale (85.2%), recruitment/retention (76.5%) and laboratory culture (69.6%). 20 respondents were not part of a network but had multiple sites. Positive impact was noted for LIMS/cross-site record access (84.2%), workload (57.9%) and laboratory culture (57.9%). Negative impact was noted for recruitment/retention (60.0%), staff morale (57.9%) and staffing levels (57.9%).

Laboratory mergers, multi-site or network, appear to have a positive impact on workload and access to patient records. A single LIMS system across multiple hospitals reduces risk of transfusion errors from failures in communication during patient transfer. However, when creating networks/mergers consideration must be given to the impact of the changes on staff morale and safety culture. Transfusion laboratories may appear small players compared to other pathology disciplines but the high-risk nature of the service means that due diligence must be accorded when forming network/mergers.

PO99 | Digital transfusion–Panacea or tar pit?

Dr Jennifer Davies[1], Mrs Kate Cowan[1], Dr Paul Kerr[1]

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Vein-to-vein electronic blood management system (EBMS) was introduced in 2017. Review of the system in 2019 noted significant reductions in wrong blood in tube (WBIT) events, handwritten (1:5609) compared to EBMS on-demand (0:28, 207). On-demand sample labelling reduced rejected sample rate by approximately 57%. Implementation of smart fridges reduced SABRE/SHOT errors from average 3.4 per year to 0. EBMS prevented administration of incorrect blood component/product on 15 occasions (2016–2018), including ABO-incompatible red cells. In 2020 electronic patient record (EPR) was implemented, including test/component ordering, EMBS was retained for patient safety and integrated with EPR.

A review of WBIT, rejected sample themes and administration errors was performed to investigate the impact of a fully digital transfusion service.

WBITs increased to 4 in 2022, using ID bands not attached to the patient. Contributory factors included increased workload and equipment failures. Rejected samples changed from transcription/omission errors to electronic errors including printer misalignment cutting off patient ID, electronic labels over handwritten information and electronic orders blocked in the LIMS interface.

Nurse prescription of red cells, outside of competence, occurred on 2 occasions and 4 near misses. Changes to process were contributory, including no access right control in EPR. No similar errors in historic paper-based system.

EBMS omission at administration increased from 16 components per year (2020) to 27 (2022) despite prompts in EPR. Scanner failure to read component barcodes and complexity using two systems contributed. Recording transfusions in EPR is unintuitive despite training/feedback approximately 10% of transfusions are invisible to clinicians.

This review highlights the impact of human factors/ergonomics on 'work as done' and 'work as imagined' when implementing digital transfusion. Staff workarounds due to printer malfunctions increased sample rejection rates and WBITs. Scanner configuration issues and complexities of using two systems for recording administration of components reduced compliance with the EBMS safety scan. Scanning patient ID bands that are not on the patient appears to be the 'norm'. There is an element of technology complacency and over-reliance of electronic processes. Digital transfusion supports patient safety but only when configured correctly using human factors/ergonomic principles. Sharing learning from our organisation experience will support others looking at digital transfusion service.

PO100 | Assessment of change from 3 to 7 day sample validity rule for pre-transfusion compatibility testing for patients treated with anti-CD38 antibody

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Introduction- Daratumumab is an anti-CD38 monoclonal antibody used for treatment of multiple myeloma. Anti-CD38 monoclonal antibodies interfere with pre-transfusion compatibility testing for red cell transfusion; CD38 antigen is weakly expressed on erythrocytes. Published evidence shows 4.0% of patients receiving daratumumab have red cell antibodies detected on pre-transfusion testing, with 0.4% new red cell antibodies on post-transfusion testing (1). Based on internal capacity issues, the Irish blood transfusion service (IBTS) red cell immunophenotyping (RCI) laboratory introduced a 7 day sample validity rule for compatibility testing for anti-CD38 antibody samples in October 2022, extended from the previous 3 day rule. We examined the rate of new alloantibody formation in this population following introduction of this change.

Methods- Samples processed in the RCI lab between October 2022 and May 2023 affected by anti-CD38 antibody were reviewed. Samples were identified by searching 'anti-CD38' on the IBTS laboratory information management system. All samples underwent indirect antiglobulin test investigation using reagent red cells treated with O.2M dithiothreitol treatment. ABO Rh/K matched units were selected for all patients. The 7 day rule was not applied to samples with pre-existing clinically significant red cell antibodies.

Results: 244 samples affected by anti-CD38 antibody were processed by the IBTS RCI laboratory between October 2022 and May 2023. 2 samples (0.8%) had pre-existing clinically significant antibodies identified on routine pre-transfusion testing and a 3 day sample validity rule was applied. 242 samples had no clinically significant antibody identified on pre-transfusion testing and a 7 day sample validity rule was applied. 154 (63%) samples had repeat samples processed post initial testing. No new clinically significant alloantibody formation was identified. A subgroup analysis of 50 (21%) samples showed that 15 (30%) required the application of the 7 day validity rule.

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Discussion- The introduction of a 7 day sample validity rule for compatibility testing in IBTS RCI for patients treated with anti-CD38 antibody did not result in new clinically significant red cell antibody formation. Based on these results and the previously published low risk of alloimmunisation in this cohort, the IBTS RCI laboratory will continue this 7 day sample validity rule on an ongoing basis.

PO101 | Pre-operative anaemia and iron replacement in surgical patients at a tertiary centre

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Introduction: Preoperative anaemia is associated with greater perioperative morbidity and transfusion frequency [1, 2]. NHS Blood and Transplant's (NHSBT) Patient Blood Management (PBM) promotes pre-emptive anaemia identification and treatment to reduce these risks. We audited our practice against National Institute for Health and Care Excellence (NICE) quality standard 138 recommendations for PBM.

Methods: We completed a retrospective single-center audit of patients undergoing procedures with expected moderate blood loss [MBL] across our trust database between 01/01/2022 and 31/08/2022. Data were collected on baseline characteristics, preoperative haemoglobin (Hb) levels and pre-operative iron replacement. The NICE QS138 audit tool was applied to this data to gather information about preoperative iron optimisation. Anaemia was defined as Hb < 130 g/L in men and Hb < 120 g/L in women.

Results: 457 patients were included, of whom 120 (26.2%) had anaemia pre-operatively. Mean preoperative Hb in patients with anaemia was 109.9 g/L [SD 10.8], compared to 131.7 g/L [SD 16.3] for the overall population. Twenty-three (19.2%) patients with preoperative anaemia went on to require a transfusion. Fifty-five (45.8%) patients with anaemia had further haematinics studies to assess their serum iron–thirteen (10.8%) of whom received iron replacement: six intravenously and seven orally. Seven patients who received iron replacement still went on to have a transfusion requirement intraoperatively, although retrospectively, only four of them had preoperative anaemia.

Conclusion: Our results show a significant pre-operative anaemia burden in patients at risk of blood loss, insufficient subsequent investigation and poor levels of optimisation. Intravenous and oral replacement are both used equally frequently, perhaps because there is insufficient time to optimise patients with oral iron between pre-assessment clinic and surgery. Interventions started since the audit include raising awareness by pre-operative leads, education of pre-assessment nurses, review of processes for intravenous iron treatment at each trust site and development of a 'preoperative anaemia order set' enabling easier investigation of haematinics. Wider integration of surgical liaison teams into pre-operative medical optimisation services might also allow more robust, multi-disciplinary assessment and management of preoperative anaemia.[3]

PO102 | Challenges caused by shared care in preventing, diagnosing and managing haemolytic transfusion reactions in patients

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Introduction: Modern healthcare provision means patients are no longer admitted to a single hospital for all their needs. Information relevant to patient safety can been held across multiple sites. Effective communication, collaboration and coordination among all teams involved in patient care is vital to ensure safety. This is compromised by gaps in information available at one site, which challenges transfusion provision where accurate histories and antibody status are essential in providing safe transfusions.

The SHOT haemovigilance scheme collects data on adverse events and reactions in blood transfusions. Year on year, cases have been reported where shared care has contributed to suboptimal outcomes and errors.

Case one.

Patient admitted with bleeding and cellulitis, Hb 78 g/L. Two samples gave negative antibody screen results, and two red cell units issued by electronic issue. The patient's Hb initially rose to 98 g/L but fell to 76 g/L 10 days later. The subsequent sample was strongly DAT positive with anti-C & M present. The patient's bilirubin and LDH had also risen. A temperature rise was recorded during transfusion but attributed to infection. The doctor was asked to speak to the patient, who confirmed receiving a transfusion at another hospital which had not been identified during the current admission. Both red cell units transfused were C and M antigen positive.

Case two.

A trauma patient was transferred from another hospital with handover notes which included no transfusion history. The patient received multiple blood components without increment and showed signs of haemolysis. This was diagnosed as a delayed haemolytic transfusion reaction. Subsequent investigation identified that the patient had record of anti-Jka from 2005 available on Sp-ICE however was not reviewed prior to transfusion due to the lack of transfusion history.

Conclusion: Access to accurate transfusion and antibody history is vital for transfusion safety. It is important for hospitals to have robust systems built into the transfusion process to share information, utilise national databases such as Sp-ICE, and capture information from the patient for example, antibody warning cards. Good collaboration, effective communication including reliable handovers, visibility and

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accessibility of key healthcare information are essential to patient safety especially in shared care settings.

PO103 | To identify length of time taken to issue group specific blood to code red patients

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Introduction: St Marys Hospital is one of London's four Major Trauma centres. When a code red or major haemorrhage is activated, high numbers of emergency group O products are issued and transfused. In response to blood supply challenges and following implementation of a new BT LIMS system in October 2022, where additional manual steps need to be undertaken to issue emergency stock, we wanted to identify the length of time taken to issue group specific blood to code red patients.

Method:

1. Trauma/Major Haemorrhage protocol patient log sheets are collected from Blood transfusion lab for 2 weeks every month, starting December 2022.
2. Patients' forms were viewed on auto card viewer to obtain details of time samples were taken.
3. Time of sample booked in, result authorised and how many stat units and group specific units issued was obtained from LIMS.

Data was tabulated into the following:

- time of trauma call
- time difference between sample taken and booked in
- time difference of sample booked in and result authorised to time group specific blood products are issued
- Number of stat units and group specific units issued

Results: In December, results show 50% of code red/major haemorrhage calls were activated during the daytime, 25% in evening and 25% during nights. Average time difference between sample being taken and booked in was 1 h 20 min. Average time for result to be authorised was 1 h. Thirty-five Group O emergency units were issued before moving onto group specific units.

In January, 50% of code red/major haemorrhage calls were activated during the night, 17% during day and 33% during evening. The average time difference between sample taken and booked in was 2 h 25 min with 1 h 44 min being average time for results to be authorised. Forty-six group O emergency units were issued before moving onto group specific units.

Conclusion: Results show change in processing samples is required to reduce the time difference between sample taken and booked in to reduce the usage of emergency group O red cell units. Monthly audits will be undertaken until this is achieved.

PO104 | Use of pre-printed labels for transfusion samples reduces the incidence of WBIT and mislabelled samples–A single centre retrospective audit

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Introduction: The dangers of 'wrong blood in tube' (WBIT) incidents are well documented in transfusion practice, with the UK's haemovigilance reporting body Serious Hazards of Transfusion (SHOT) recording high and increasing numbers of WBIT and near miss incidents each year. The 2021 SHOT report identified 734 WBIT incidences in the UK[1]. The Norfolk and Norwich University Hospital is a 1200 bed district general hospital in Norfolk serving a catchment area of approximately 1,016,000 people[2]. Our transfusion laboratory accepts handwritten samples and those with electronically-generated labels at bedside. It also accepts samples labelled with pre-printed 'addressograph' labels available in patient notes, outside of BCSH guidelines on pre-transfusion compatibility procedures[3]. Our site appears fairly unique compared to national practice in other transfusion laboratories[4].

Method: We conducted a retrospective audit of sample labelling, mislabelled samples and WBIT incidences at the Norfolk and Norwich Hospital from July 2012 to September 2015 and compared this to available national data.

Results: A mixture of handwritten, electronically-generated at bedside, and pre-printed labels were used for transfusion samples at our site during the audit period. The rate of mislabelled/rejected samples at our site was less than the overall national average measured in the national comparative audit on blood sample collection and labelling[4]. In the recorded WBIT samples during our local audit, the majority had handwritten labels with a minority utilising pre-printed labels. Our WBIT incidence compared favourably with previously reported incidences in other UK hospitals as well[5, 6].

Conclusion: Our findings indicate that pre-printed labelling of group and screen samples accounts for fewer WBIT errors than would be expected, and contrary to BCSH recommendations on acceptability of pre-printed labels for transfusion samples. Conversely, handwriting of patient details appears to be related to a higher incidence of WBIT than would be expected too. On the basis of these findings, we would question the preclusion of the use of pre-printed labels for transfusion samples. Ongoing audit at our site is required to confirm this trend, as well as further formal studies on factors associated with WBIT errors.

PO105 | Drastically reducing A, B and O red cell time-expired wastage at Kent and Canterbury hospital (A moderate user as defined by the blood stocks management scheme)

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Kent and Canterbury Hospital (KCH) whilst without maternity and A&E has busy Renal, ITU and haematology departments and is Kent's

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centre for inpatient vascular surgery. The current red cell stock holding is 51 units. We receive two weekday routine blood deliveries and a SERV delivery (if required) around midnight.

Blood is a valuable (and expensive) selflessly donated resource. In July 2022, 13 units (£1992.90) were wasted at KCH as time-expired. This prompted a change in practice.

Time-expired wastage is, in most cases, avoidable by transfusing non-ABO identical units. However, this may lead to potential grouping discrepancies in the future, exclude patients from electronic issue and require manual cross matching. At £153.30 per unit we were willing to try.

Method.

1. Publish the cost of blood products–Simple A4 sheet displaying the cost of products from NHSBT.
2. Remind staff about wastage costs–Regular updates about the wastage and financial implications.
3. Yellow and Red Short-Dated Expiry tabs for blood products–Blood expiring in ≤5 days has a yellow tab to warn it is approaching expiry, blood expiring in ≤3 days has a red tab, indicating it should be used ASAP.
4. Reduced irradiated blood stock holding–This has a maximum 14 day shelf life. Historical practices meant that we held a high level of irradiated stock, following discussions at HTC irradiated stock levels were reduced by 64% (from 22 to 8)
5. Ordering long-dated Group B blood (Frequently wasted as time expired)–No longer irradiated and with longer expiry.
6. Trust IT created a live Trust stock database–Access to all blood stocks in expiry date order across the trust which facilitates movement as required.

Results.

Time-expired wastage of A, B or O red cells has not occurred at KCH for over eight months. This is saving >£600 per month (based on average wastage cost since Jan 2020). Reduced irradiated stock holding is saving the trust >£700 per month.

Conclusion.

Simple reproducible solutions and amended stock holding has improved staff awareness of blood wastage and saved over £1300 per month without compromising the patient experience.

PO106 | Analysis of fresh frozen plasma wastage at a tertiary care centre in the UK

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Introduction: Fresh Frozen Plasma (FFP) is a crucial blood component utilized in various clinical settings, including massive blood transfusions. However, after thawing, FFP has a limited usability window of 4 h at 22 ± 2°C or up to 120 h at 4 ± 2°C, which often leading to significant discard rates. The primary objective of this study was to analyse the discard pattern of FFP and specifically identify potential areas for optimizing resource utilization, as well as enhancing practices related to data collection and storage pertaining to FFP wastage.

Methods: This retrospective study analysed data collected from May to August 2022 at the University Hospital, Coventry using electronic and paper-based sources. The study incorporated Excel datasheets used for the purpose of conducting blood component discard related cost calculations. The timeline of each unit was analysed using BloodTrack® software. In order to determine the factors contributing to discarding, the study employed paper-based Blood/Component Wastage Monitoring Forms and Blood/Blood Product Wastage Data Collection Forms.

Results: During the study period, 367 units of FFP were discarded, with AB units being the most commonly wasted (70.6%), including a significant number of AB negatives (17.7%). The highest wastage was observed in August, with 123 units discarded (33.5%). 90.2% of the discards were categorized as Wasted by Ward in the data sheets. 167 units were thawed for the Massive Transfusion Protocol, and 81 for the use in the Air Ambulance. While Thawed & Not Used (21.6%) was commonly cited as the primary reason for discarding FFP units, this lacks specific reason for their disposal. 13.6% of the discarded units lacked the required Wastage Monitoring Forms.

Conclusion: The high wastage of AB FFP necessitates finding alternative solutions, such as considering the use of group A FFP. Scattered wastage-related data across multiple electronic and paper-based sources creates significant challenges in conducting effective audits. Furthermore, a substantial proportion of units lacked documented information regarding the reasons for disposal. Implementing electronic data collection and storage instead of paper-based forms and centralizing wastage-related information into a unified system are recommended to facilitate auditing, improve data accuracy and potentially reduce discard rates.

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