Cases from the 2022 Annual SHOT Report

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They have been loosely categorised, but some cases may be appropriate to illustrate more than one type of error

Acknowledging Continuing Excellence in Transfusion (ACE)

Speaking up for patient safety despite hierarchical barriers

- *A healthcare assistant (HCA) noticed a registered agency nurse taking two samples for a group and screen at the same time*
- *The HCA challenged the process as this was against the organisations policy, however the nurse stated that they were going to put a different time on one sample*
- *The HCA reiterated safe practice and local policy (that samples must be taken at different times by different people), removed and disposed of duplicate sample, and raised a near miss incident on the local reporting system*
- *A repeat sample was taken and sent to the laboratory*
- *The patient in question had no previous blood group on the system*
- *The transfusion practitioner provided positive feedback to the HCA and escalated the incident to the organisation's central safety team*
- *They have also incorporated this scenario into mandatory transfusion training*

Excellent teamwork and communication during a major haemorrhage protocol (MHP) activation

- *The MHP was activated for a patient in the emergency department (ED) of a medium sized hospital*
- *The clinical staff on duty followed all procedures correctly, and the communication between the clinical area and laboratory was excellent*
- *The biomedical scientist on duty was informed when the patient was expected, a single person for communication was established and all components taken out of the refrigerator or requested from the hospital transfusion laboratory (HTL) were communicated clearly in a timely manner*
- *The MHP was stood down at the end of incident*
- *Good communication between the clinical area and the HTL allowed for a very smooth running of the MHP with one person allocated to form that line of communication*
- *Learning from this event was shared via email with the matron in the ED for them to disseminate to members of the team*

Donor Haemovigilance

Donor had a syncopal episode on session and later diagnosed to have Brugada syndrome

- *A young male whole blood donor, in his 30s, experienced a syncopal episode which was thought to be an immediate vasovagal reaction following his first donation*
- *He was suspected to have sustained a minor head injury following this syncope*
- *He recovered sufficiently at session to be able to go home with family but had attended hospital since and following further investigations, was diagnosed with Brugada syndrome*
- *The donor was withdrawn from future donations*
- *The donor had commented he was grateful that due to his donation, his unidentified condition had been diagnosed*

Delayed vasovagal reaction leading to a road traffic accident

- *A female donor in her late 60s, gave a unit of whole blood at a community session*
- *Donation was unremarkable. She left immediately after receiving a post-donation drink on the bed and drove away from the session*
- *At some point she lost consciousness. A passer-by observed that her car drifted to the side and then scraped along a wall bordering the street, before coming to a gradual stop*
- *The donor came round shortly afterwards and was unharmed. No one else was involved*
- *After being assessed by paramedics the donor was allowed home*
- *The donor had successfully given many times with only one minor vasovagal episode at session several years earlier*
- *She was not on any medication and had no recent medical treatment apart from a COVID-19 booster four weeks earlier*
- *On reflection, she noted that although she had not felt unwell after donation, she would have benefitted from taking longer to recover*
- *In total she had been at the session for less than 30 minutes. In view of the severe delayed vasovagal reaction, she was deferred from future donation*

Myocardial infarction within 24 hours of donation

- *A regular female donor in her 70s, had given 62 donations previously*
- *She donated whole blood uneventfully following her health screen when no concerns were reported*
- *The donor then called the Blood Service and reported that she had a myocardial infarction requiring two stents within 24 hours of donating*
- *Prior to donating, the donor had noticed an increasing sense of heartburn type symptoms, the donor assumed this was related to her acid reflux so did not mention this to session staff as she felt well at the time of donation*
- *Upon investigation the donor did have a family history of cardiovascular disease, but she was not known to have any cardiovascular disease*
- *This donor has since been withdrawn from donating*

Human Factors and Ergonomics in SHOT Error Incidents

Incorrectly labelled sample used for urgent crossmatch during major haemorrhage protocol (MHP)

- *A patient with acute bleeding required an urgent red cell transfusion and the sample was accepted out-of-hours by biomedical scientist (BMS) 1 who missed an incorrect date of birth*
- *The sample was used for crossmatch during an MHP activation by BMS 2*
- *The red cell units were issued and transfused to the patient*
- *A second MHP activation was triggered for the patient and the same sample was attempted to be used by BMS 1 who noticed the sample discrepancy during the final check so repeat samples were requested*

Incident action plan demonstrates a holistic approach

- *A unit of B D-negative red cells was transfused to the wrong recipient who was group O D-positive*
- *Nurse 2 was asked by Nurse 1 to request collection of a unit of red cells*
- *Nurse 2 requested a unit of red cells for Patient 2, but it was Patient 1 that required the transfusion*
- *The unit arrived in the clinical area and was checked by two nurses outside of the single person room remotely from the bedside*
- *It was then administered to Patient 1 without verbal confirmation*
- *Patient 1's identification band had been cut off earlier in the shift to remove an arterial line*
- *The nurses involved noted that after the COVID-19 pandemic more checks were being performed outside rooms, although at the time of this incident, neither patient was COVID-19 positive*
- *The patient did not have any observable reaction nor evidence of haemolysis and the error was detected by laboratory staff who noticed mixed field reactions in ABO and D grouping tests post transfusion*

Adverse Events Related to Anti-D Immunoglobulin (Ig)

Failure to attend appointment and no follow up

- *A D-negative mother did not receive routine antenatal anti-D Ig prophylaxis (RAADP) at 28 weeks in the community setting*
- *The mother did not attend the clinic appointment at 28 weeks, and this was not followed up by the clinical team*
- *The omission was noticed later in the pregnancy by the laboratory team*
- *The incident was reviewed, and improvement actions identified*
- *It was agreed that the community clinic would be included in the hospital patient booking system so that non-compliance could be managed electronically by sending reminders to both mother and clinic staff*

Discharge prior to administration leading to delay

- *A D-negative patient had a termination of pregnancy at 12^{+1} weeks*
- *Anti-D Ig was issued but not administered before the patient was discharged*
- *The ward staff realised the patient required the anti-D Ig and arranged for it to be administered 2 days after the procedure*
- *The patient then informed the clinical team that they a positive lateral flow COVID-19 test and so were unable to attend for the appointment*
- *Confirmatory COVID-19 polymerase chain reaction testing was negative 2 days later and the patient attended for the anti-D Ig injection, 4 days post procedure*

Anomalous D-type leading to omission

- *A mother's blood group from the booking blood sample was A D-positive*
- *The blood sample taken at the routine 28-week appointment was weakly positive for D-type and so the sample was referred to the Blood Service for further testing*
- *The Blood Service established that the mother had a partial D-type and advised that they should be treated as D-negative*
- *This information was not entered into the electronic patient records in a timely manner and resulted in omission of anti-D Ig during pregnancy and at delivery*

Incorrect Blood Component Transfused (IBCT)

Collection error and lack of pre-administration positive patient identification leads to an ABO-incompatible (ABOi) transfusion

- *Following cardiac surgery, a female in her 70s received an ABOi transfusion during a major haemorrhage (MH)*
- *The patient was group O D-negative and was inadvertently given B D-positive*
- *A unit of red cells was collected by a porter from the issue refrigerator, but this was for another patient on a different ward*
- *None of the details on the issue label/compatibility label were checked*
- *Soon after, the porter realised the error and reported to laboratory staff, but the red cell unit had already been transfused*
- *BloodTrack® was available but not utilised and ward staff did not carry out any pre-administration checks*
- *The emergency response team were not trained to use BloodTrack®*
- *The ward staff were inexperienced in dealing with MH and this event was very unusual and traumatic for those involved*
- *The patient died on return to theatre and the death was attributed to complications of cardiac surgery*

Collection error and incomplete pre-administration checks lead to a haemolytic reaction (1)

- *A patient with blood group O D-positive was admitted to the high dependency unit following a surgical procedure associated with a history of life-threatening sepsis on the background of poorly controlled diabetes*
- *The patient was transfused A D-positive red cells as part of a routine transfusion*
- *The collector transported the red cells from the transfusion laboratory for two patients in two different clinical areas and accidentally mixed the two blood boxes up, therefore the wrong blood component went to the wrong location*
- *In the clinical area the pre-transfusion checking procedure was significantly disrupted as the patient would not permit the nurses to check their identification band, was displaying challenging behaviour and was demanding that staff use their chosen name (the patient was known by a chosen name that did not bear any resemblance to their formal name)*
- *There was a determined effort by staff to undertake the usual pre-transfusion checks, but this was unsuccessful*

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Collection error and incomplete pre-administration checks lead to a haemolytic reaction (2)

- *The error was detected when the other clinical area phoned the transfusion laboratory to ask where the red cell unit was that was intended for their patient*
- *This was 45 minutes after the blood components had been delivered to each location*
- *Laboratory staff phoned the clinical area to explain the error, asking for the unit to be returned immediately but staff confirmed the transfusion was almost complete*
- *The remainder of the transfusion (10-15mL) was stopped immediately*
- *Senior medical staff were informed, and emergency treatment was commenced*
- *The patient required plasma exchange and renal replacement therapy*
- *The patient died one week after the ABO-incompatible transfusion*

Distractions, familiarity and assumptions lead to an ABO-incompatible transfusion

- *A male patient in his 40s (patient 1) with sickle cell disease was due to receive a routine exchange transfusion as an out-patient*
- *The patient was O D-positive but was given B D-positive red cells*
- *The nurse was about to administer a unit of red cells to patient 2*
- *They became distracted because patient 1's infusion alarm sounded*
- *The nurse, still holding the unit, addressed the alarm and then connected the unit to patient 1 in error*
- *The patient was not wearing an identification band, positive patient identification was not carried out as the nurse was familiar with patient 1, and no other pre-administration checks were completed*
- *The patient consequently experienced chest and groin pain with a feeling of impending doom and was admitted to the high dependency unit for additional observations and monitoring*
- *This gentleman recovered but is consequently very anxious about future treatments*

Communication failure and lack of positive patient identification leads to an ABO-incompatible transfusion

- *A female patient in her 50s with pneumonia and respiratory failure received an ABOi red cell transfusion*
- *The patient was blood group O D-positive and was given B D-negative red cells during a routine transfusion*
- *Nurse 1, caring for this patient, was about to go on their break and asked nurse 2 to arrange for the porter to collect a unit of red cells for this patient*
- *This was carried out, but nurse 2 requested the unit for their own patient in error*
- *Both nurses checked the unit number on the blood component, blood group and expiry date on the red cell unit but did this outside of the patient's room*
- *They did not check the patient's identity (ID) band*
- *Nurse 1's familiarity with the index patient resulted in an assumption that they knew the patient without having to check their identity, unaware of the errors that had already occurred*
- *Earlier, nurse 1 had removed the patient's ID band as it was making it difficult to remove one of the patient's intravenous cannulas*
- *They intended to re-apply a new ID band but forgot to do so*

A wrong blood in tube error leads to ABO-incompatible transfusion in 2016

- *In 2022 a male patient in his 70s was admitted to the emergency department with acute kidney injury, diabetes, and cardiac problems*
- *A pre-transfusion sample was sent for crossmatching and showed an ABO/D grouping discrepancy from historical bloods taken in 2016*
- *During a lookback at the patient's clinical records, it appeared that the patient had received two units of group B D-positive red cells during an urgent transfusion on a general ward during the previous admission*
- *There was no indication of a transfusion reaction, and blood results showed no signs of haemolysis*
- *The patient was confirmed to be group A D-positive*

D-positive red cells issued to a D-negative patient due to cognitive bias

- *A female patient in their 60s was admitted in renal failure, and a request of two units of red cells was made to the transfusion laboratory*
- *The patient had a flag for irradiated components on the laboratory information management system (LIMS) but, due to local policy, this required confirming with the clinical area as several years had passed since their previous admission*
- *The local team completed the required specific requirements form, but two forms were sent to the laboratory with disparity between the requirement for irradiated components*
- *As a precaution the biomedical scientist (BMS) updated the LIMS to state continue to give irradiated until the discrepancy could be resolved*
- *The patient was group AB D-negative, but the BMS issued A D-positive red cells in error*
- *Information technology alerts were overridden as the BMS assumed these were due to ABO substitution, and as their focus remained on the irradiated requirement, they did not detect the D-incompatibility*

Crossmatching errors resulted in a patient receiving uncrossmatched red cell units

- *A biomedical scientist (BMS) performed automated crossmatches for Patient 1 and Patient 2 on the blood grouping analyser*
- *In error they crossmatched the same two units of red cells against both patients*
- *Patient 1 received the two crossmatched units, but Patient 2 received two uncrossmatched units*
- *Later during the day, the BMS detected their error and retrospectively crossmatched Patient 2 with the correct two units, but this was after the transfusions had been completed*
- *The staff member was a bank BMS with known stress-related issues but was working a supported day shift*

Omission of pre-administration checks leads to a wrong patient transfusion (1)

- *Patient 1 and Patient 2, in adjacent rooms, were under the care of a regular agency nurse*
- *Red cells were prescribed and crossmatched for Patient 1 (a male in his 70s) who was group A D-positive*
- *The agency nurse did not have access to the electronic administration system which would have allowed them to collect the red cell units for transfusion*
- *Another ward nurse collected the red cells (same blood group) on their behalf and on return scanned a pre-printed ID band which was in the patient's clinical notes*
- *The red cell unit was then handed to the agency nurse to administer*
- *The blood component had been scanned away from the patient's bedside*

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Omission of pre-administration checks leads to a wrong patient transfusion (2)

- *The agency nurse, who was not trained to administer blood transfusions, took the unit to Patient 2 (a female in her 80s) in error and the other nurse did not go to the patient's bedside with them to complete pre-administration checks*
- *Pre-transfusion observations and bedside checks against the blood unit, prescription and patient were not completed and the transfusion was started*
- *Patient 2 needed assistance to use the bathroom and at this point the ward nurse noticed the error and stopped the transfusion*
- *By now 176mL had been administered to the wrong patient*
- *Both patients had the same blood group and the patient who had been given the transfusion incorrectly suffered no adverse effects*

Lack of clear communication leading to incorrect component transfused

- *A male in his 70s with neutropenic sepsis and lymphoma had been prescribed platelets*
- *The patient had also been prescribed red cells but they were not to be transfused unless there was a drop in the patient's haemoglobin from 69g/L*
- *The nurse contacted the porter and asked them to 'collect a blood unit from blood bank'*
- *The porter went to the laboratory refrigerator and collected a unit of red cells*
- *Upon arrival of the component on the ward, the red cells were handed over to the nurse*
- *The blood component and patient details were checked by two registered nurses*
- *Although the details checked were all correct, staff failed to recognise that the blood component being transfused was red cells and not the platelet unit that was meant to be given*
- *The error was discovered 15 minutes into the transfusion when the nurse was about to check the patient's first set of observations*
- *The transfusion was discontinued immediately, and the patient was reviewed by the medical team*
- *The patient was stable throughout and no complications occurred 24-48 hours post transfusion*
- *The patient then received their platelet transfusion*

Lack of consideration of pregnancy and Hodgkin lymphoma on transfusion requirements

- *A female in her 20s who was pregnant and had very recently been diagnosed with Hodgkin lymphoma attended the haematology/oncology clinic for transfusion of red cells as she had a haemoglobin result of 86g/L*
- *Two units of red cells were requested and were issued by the laboratory*
- *The staff nurse later contacted the laboratory to report a possible transfusion reaction during administration of the first red cell unit*
- *When the biomedical scientist was taking these details, the nurse happened to mention that the patient was pregnant*
- *No information had been given on the request form, pregnancy 'yes' was not circled*
- *The two units issued were not cytomegalovirus (CMV)-negative*
- *The second unit was recalled*
- *This patient should have also received irradiated blood components*

Lack of consideration of pregnancy on transfusion requirements

- *A female in her 30s was pregnant at 36/40 weeks gestation*
- *She had been admitted due to experiencing reduced fetal movements, hypertension and a haemoglobin of 82g/L*
- *The transfusion laboratory received a request for four units of red cells*
- *The transfusion request did not specify the transfusion requirements namely 'cytomegalovirus (CMV)-negative units required' or that the patient was pregnant*
- *The midwife informed the biomedical scientist that the red cells were for standby and would only be transfused post delivery, if required*
- *The following day it was identified that the red cells were required to treat the patient's anaemia, not to cover for any blood loss relating to a caesarean section*
- *One of these red cell units had been transfused to the patient at this point*
- *As the patient was pregnant, she should have received CMV-negative units for all routine transfusions prior to delivery*

Incorrect ABO group issued via electronic issue in error for a liver transplant patient

- *A group A male patient in his 30s underwent a liver transplant from a group O donor*
- *The laboratory information management system was not updated with the appropriate flag to reflect the transplant and the requirement of group O red cells and exclusion from electronic issue, with only a note of the liver transplant added to the notepad section*
- *Six units of group A red cells were transfused during theatre, and 5 days post transplant a further unit of group A red cells was released via remote issue*
- *The investigation stated the standard operating procedure was not clear on when the flag should be added*

Incorrect D-positive platelets issued to a child post haemopoietic stem cell transplant (HSCT) with preventative actions for other transplant patients

- *A young D-positive child received a D-negative HSCT but was issued D-positive platelets in error*
- *Preventative action in this organisation was to create new laboratory information management system flags for transplant groups with this new alert being added to all patients who had received a transplant in last 4 years*

Incorrect ABO platelets issued following haemopoietic stem cell transplant (HSCT) with contributory human factors

- *A group O D-positive male in his 30s received an A D-positive HSCT but was issued with group O platelets in error*
- *There were laboratory information management system (LIMS) alerts in place, but the reporter stated that there were limitations associated with management of platelets in transplant patients*
- *The laboratory relied on biomedical scientist staff being familiar with these limitations when selecting appropriate platelets*
- *Multitasking of multiple crossmatches and platelet requests and rushing to complete work prior to the end of their shift also contributed to this error*
- *Workload management has been discussed with the transfusion laboratory team, and the limitations within the LIMS have been escalated on the local risk register*

Handling and Storage Errors (HSE)

Unit of red cells transfused exceeding time allowed after removal from controlled storage (1)

- *Two units of red cells were removed in a cool box validated for 6 hours at 22:13 for a patient in the emergency department (ED)*
- *The first unit was transfused in the ED over 3 hours and then the patient was moved to a ward*
- *The second unit was transferred with the patient in the cool box to the ward*
- *The second unit was started after being in the cool box for 5.5 hours and transfusion was not completed until 8.5 hours after removal from the blood refrigerator*
- *On investigation the patient was being transfused in the ED but was not actively bleeding*
- *The blood prescription was for two red cell units each to be transfused over 3 hours*

Continued…

Unit of red cells transfused exceeding time allowed after removal from controlled storage (2)

- *Both units were removed from the refrigerator at the same time by a porter who was used to requests from ED for bleeding patients requiring more than one unit to be transfused quickly and would collect and pack in the 6-hour cool box used for massive haemorrhage activations*
- *There was no documentation to suggest that only one unit was to be collected when two were prescribed*
- *ED at the time were operating under operational pressures escalation levels (OPEL) 4 conditions (pressure in the local health and social care system continues to escalate leaving organisations unable to deliver comprehensive care)*
- *The patient was symptomatic with anaemia caused by severe iron deficiency*
- *There was no facility to transfuse the patient in a more appropriate setting for the next 4 days, so the general practitioner sent the patient to the ED for transfusion*

Acknowledging continuing excellence case

- *A National Health Service organisation has submitted report of an innovation project to address previous red cell transfusions that went over 4 hours, including >5-hour episodes that were reportable to SHOT*
- *Transfusion take-down tags were designed, trialled and produced to increase awareness in the clinical area, to inform all staff in the vicinity and empower the patient, to prompt an appropriately trained member of staff to take the red cell unit down within 4 hours of removal from the cold chain*
- *The tags increase compliance with the Blood Safety and Quality Regulations and reduce the risk of potential bacterial infection*
- *From the feedback received, all patients during the trial period understood the concept and felt this helped them prompt a staff member to complete their transfusion and take the unit down if it is nearing the 'take down time'*
- *The patients reported feeling safer during their transfusion*
- *There were no further incidents of transfusions exceeding 4 hours during the trial usage of the tags*

Unit of red cells transfused with no documented cold chain for 36 hours

- *A unit of emergency O D-negative red cells was taken to the emergency department*
- *It was not used and returned to the laboratory 2 days later*
- *This was returned to stock instead of being put into quarantine as there was no documented cold chain for the 36 hours the red cell unit was out of the laboratory*
- *The unit was then issued to another patient and transfused*
- *The error was only picked up by chance when staff looked for the missing compatibility tag*

Avoidable, Delayed or Under/Overtransfusion (ADU), and Incidents Related to Prothrombin Complex Concentrates (PCC)

Failure to recognise internal haemorrhage with fatal outcome

- *A man in his 70s arrived in the emergency department (ED) at 10:01 with chest pain and confusion. He had previously been discharged 2 days earlier with a chest infection and COVID-19 on doxycycline (which can enhance the anticoagulant effect of warfarin)*
- *He was on warfarin together with low-molecular-weight heparin (LMWH) as bridging for a low international normalised ratio (INR) (anticoagulated for an artificial heart valve)*
- *On admission his blood pressure at 11:17 was 97/57 falling to 89/52 at 12:34 with a raised early warning score (10) and he was drowsy*
- *He was covered in bruises and haemoglobin had reduced from 139g/L, taken 2 days earlier, to 86g/L on admission; 77g/L at 16:43 and later to 62g/L*
- *His INR was 3.7 and was not reversed*
- *After 12 hours in the ED at 22:08 he was found unresponsive (last seen at handover at 19:30); at 22:10 noted to be in asystole*
- *Cardio-pulmonary resuscitation was started.*
- *The major haemorrhage protocol was called at 22:33, but he died at 23:11*
- *He had extensive flank bruising and was thought to have had a catastrophic intra-abdominal bleed*

Failure to respond to ongoing gastrointestinal bleeding in a timely manner

- *An elderly man was admitted with melaena on a Wednesday with a haemoglobin (Hb) of 49g/L and was treated with two units of red cells*
- *Repeat Hb was 68g/L and 2 days later a further unit was given*
- *He was not reviewed by the appropriate team nor were blood components prescribed to treat signs of ongoing bleeding and hypovolaemia over a 4-day bank holiday weekend*
- *The on-call doctor noted his blood pressure was 90/50, and heart rate 90bpm but stated the patient was haemodynamically stable*
- *The nursing team had identified clinical deterioration and attempted to escalate this concern to the medical team*
- *The Hb remained low and the major haemorrhage protocol was activated in the evening of the first normal working day (Tuesday)*
- *Despite transfusion he had ongoing bleeding and was too unstable for endoscopy*
- *Treatment was withdrawn and he died the following day (7 days after admission)*

Delayed Transfusions

Delayed red cell transfusion and death in a patient with gastrointestinal haemorrhage

- *An elderly person (known anaemia due to chronic myeloid leukaemia) was seen in the emergency department at 18:20 with coffee-ground vomit*
- *Blood samples ('routine') were received in the laboratory 3 hours later (21:24), Hb 58g/L*
- *Red cell units were requested (not identified as urgent) but irregular antibodies were detected, delaying provision of compatible units until 23:00*
- *The major haemorrhage protocol was activated at 23:40 and due to communication failures, the patient received emergency group O D-negative units (possibly incompatible); the patient was hypovolaemic, arrested and died*

Delayed platelet transfusion in a patient with severe thrombocytopenia due to acute myeloid leukaemia (AML)

- *An elderly man with AML had a Hb of 65g/L and platelets $2x10^9$/L at an outpatient visit*
- *He was contacted to return for transfusion*
- *Platelets were ready at 15:30*
- *He attended the emergency department at 17:00, and fell at 19:30 sustaining a head injury*
- *He was transfused platelets at about 22:30*
- *He died of a subdural haematoma with brain herniation as a result of traumatic head injury following the fall*
- *The 5-hour delay in platelet transfusion was considered contributory*

Delayed transfusion and death - sample errors and failure to recognise gastrointestinal (GI) bleeding

- *A woman in her 60s, recently in hospital with myocardial infarction, was readmitted 3 weeks later at 04:10 with recurrent chest pain, vomiting and acute anaemia*
- *Her haemoglobin (Hb) had fallen from 113g/L to 68g/L over 3 weeks. She was thought to have further myocardial infarction secondary to anaemia*
- *The first sample at 04:30 was rejected; transposed first and last names*
- *The same error was repeated with a second sample at 08:26*
- *The biomedical scientist made several unsuccessful attempts to contact the emergency department, unanswered telephone calls*
- *Eventually new samples were received at 11:39; two red cell units were available at 13:36*
- *However, the major haemorrhage protocol was activated at 13:04 (Hb 34g/L) and four units of emergency O D-negative red cells were used*
- *Despite this she died. Her anticoagulants had not been reversed and the GI bleeding was not identified until the very low Hb was recorded*
- *A serious incident investigation was undertaken to establish what caused the delay in identification of GI bleeding; noted that the patient's first language was not English, and this may have been a contributory factor*

Delayed transfusion due to haemolysis contributes to death

- *An elderly woman was admitted to the emergency department at 20:06 following collapse at home (chemotherapy 10 days earlier)*
- *Hypotension improved with intravenous fluids*
- *Venous blood gas haemoglobin was 54g/L*
- *Blood tests were uninterpretable due to haemolysis (including blood group, antibody screen and crossmatch)*
- *The haematology consultant advised immediate transfusion of emergency group O red cells with steroid cover*
- *At 03:13 prednisolone was given but no red cells*
- *She suffered cardiac arrest at 05:10 with successful resuscitation but resuscitation was not attempted after another cardiac arrest*
- *Death was considered 'possibly related' to this delay*

Delayed transfusion in a patient with sickle cell disease (SCD) associated with clinical deterioration

- *A patient with SCD, and a haemoglobin of 64g/L, had two units of red cells authorised to be given as soon as available, but was not transfused until the following day*
- *Nursing staff were unclear when the blood was meant to be given despite verbal handover the day before*
- *The patient deteriorated with worsening chest pain and new oxygen requirement and subsequently required exchange transfusion*

Delayed transfusion due to communication failures and lack of clarity in the major haemorrhage protocol (MHP)

- *A woman experienced unexpected major bleeding the day after routine cholecystectomy (accidental damage to the portal vein) resulting in MHP activation*
- *She was haemodynamically unstable with a pre-transfusion haemoglobin of 36g/L*
- *There was a 15-minute delay in the issue of red cells because the biomedical scientist was unclear about the patient location (transferred from the intensive care unit to theatre) and whether formal patient identification was needed*
- *She received 15 units of red cells, six of plasma, one of platelets and fibrinogen*

Delayed transfusion for gastrointestinal (GI) bleeding contributes to death

- *A woman in her 70s on anticoagulants for atrial fibrillation suffered GI haemorrhage*
- *Her haemoglobin (Hb) of 97g/L had reduced over 4 days to 63g/L and at 00:41 the Hb on the blood gas machine was 40g/L*
- *The decision to transfuse was made several hours earlier at 16:00*
- *A sample sent to the laboratory got lost in transit*
- *Following repeat sampling, crossmatched units were issued for collection at 20:30*
- *The first unit was collected at 00:38*
- *The major haemorrhage protocol was activated at 00:50 as the first unit was set up*
- *There were multiple delays: with decision and prescription; there were staffing issues, and a sample lost in transit*

Delayed transfusion in gastrointestinal (GI) bleeding with confusion over the arrest call

- *A cardiac arrest call was made at 01:39 for a patient in his 40s with acute severe upper GI haemorrhage*
- *The doctor asked nursing staff to make an 'adult cardiac arrest call' and 'major haemorrhage protocol' activation, however this resulted in only the cardiac arrest call*
- *The major haemorrhage call was put out 20 minutes later*
- *The patient had antibodies and needed confirmation from a haematologist about which components to issue*
- *Resuscitation continued for 20-25 minutes, with ongoing bleeding and was discontinued at 02:08*
- *Blood arrived at 02:15*
- *The blood was packed and ready at 02:07 so took 16 minutes from time of activation ready*
- *The clinical team identified 2 delays that resulted in the patient not receiving urgent components in a timely manner - the delay in the call being put out and in receiving the blood from the laboratory*

Delayed transfusion of platelets following head injury

- *A middle-aged male alcoholic fell and suffered subdural haemorrhage*
- *His platelet count was $35x10^9/L$ and he required platelet transfusion prior to transfer to another hospital*
- *There were communication problems about the urgency, and group A platelets were provided an hour after the initial request*
- *After transfer he was not fit for surgery, having fixed dilated pupils and was declared dead*

Delayed recognition of postoperative bleeding contributes to death

- *An elderly woman was admitted with a tibial plateau fracture*
- *On admission her haemoglobin (Hb) was 134g/L*
- *Three days later her Hb was 87g/L*
- *Early the next day at 03:05 the major haemorrhage protocol (MHP) was activated*
- *There was clinical evidence of bleeding and concern about vacant episodes*
- *Two units of red cells were given to the patient as part of the MHP activation*
- *She showed mild improvement but developed severe metabolic acidosis and died the following day*

Delayed transfusion with lack of knowledge about policies

- *An elderly woman with multiple medical problems was reviewed at 08:30 for melaena with hypotension*
- *Her haemoglobin was 65g/L; adequate blood pressure was restored with fluids*
- *The plan for transfusion was delayed by misunderstandings and poor communication*
- *The ward staff wrongly thought a second sample was needed but it was not required*
- *Although a group and screen was requested at 11:43 this did not include red cells*
- *She was found unresponsive and hypotensive at 13:11 when red cells were requested but she died before any blood was transfused*
- *The use of emergency group O units was not considered, and the urgency of transfusion had not been communicated to laboratory staff*

Delayed transfusion associated with myocardial infarction and irregular antibodies

- *A patient with Hodgkin lymphoma and recurrent anaemia on chemotherapy required urgent transfusion, haemoglobin (Hb) 76g/L*
- *However, due to a lack of beds this was planned for 4 days later*
- *The Hb the day before the planned transfusion was 52g/L with atypical antibodies*
- *She attended the emergency department at 19:46 for urgent transfusion requiring irradiated, and crossmatched red cells from the Blood Centre*
- *She developed chest pain and had a myocardial infarction at 04:29 the following morning*
- *She was transfused at 10:15 (waiting for crossmatched components for more than 12 hours)*
- *The patient had autoimmune haemolysis requiring admission to the coronary care unit*

Avoidable Transfusions

Excessive transfusion for iron deficiency

- *A woman with menorrhagia, a haemoglobin (Hb) of 69g/L and moderate symptoms of anaemia received four units of red cells authorised by a junior doctor*
- *One was warranted, but she should have been reviewed and Hb checked after each unit (or at the very least after two units)*
- *Her Hb was not measured until after the third unit and the result (Hb 105g/L) was not checked until after the fourth unit had been given*
- *Her ferritin of 8micrograms/L was not acted on*
- *There was a lack of understanding about the appropriate treatment of anaemia without transfusion*
- *An anaemia clinic had been suggested but there was no funding*

Results transcription error leads to unnecessary transfusion

- *An oncology patient received a transfusion of three units of red cells in a community hospital after a transcription error on the blood results recording page led to the platelet count of '80' being misread as the haemoglobin (Hb)*
- *At the outpatient follow up appointment after transfusion, the Hb was over 200g/L*

Recent results not reviewed before commencing a transfusion prescribed in advance

- *A patient in their 80s with pure red cell aplasia was referred to the day ward for regular transfusion, two units of red cells every 2 weeks*
- *She had recently been started on steroids*
- *Full blood count was taken on arrival to the ward but transfusion of the first unit of red cells was started before the haemoglobin (Hb) result came back*
- *The Hb was 140g/L and transfusion was stopped*
- *Her Hb check 1 day before was also normal*

Miscommunication at verbal handover leads to a patient receiving an unnecessary red cell transfusion with an invalid prescription

- *A female (Patient 1) in her 50s was admitted to a haematology ward with acute myeloid leukaemia and graft-versus-host disease*
- *Her haemoglobin (Hb) result on admission was 120g/L. She was due to receive extracorporeal photopheresis (ECP) the following day, and there was a unit of red cells on standby in case they were required for this procedure*
- *During a verbal handover Nurse 1 asked Nurse 2 to carry out two separate tasks; to obtain blood samples from Patient 1, and administer a red cell transfusion to Patient 2*
- *Nurse 2 thought that they had been asked to transfuse Patient 1 and as there was a unit of blood in the refrigerator for Patient 1 (on standby for ECP), they collected this*
- *Pre-administration checks, including positive patient identification, checking the details of the patient with the identity (ID) band and prescription chart, and the final check of the compatibility tag with the ID band were carried out by two nurses*
- *They did not notice the blood transfusion prescription dated 2 days previous to this and had not reviewed the patient's Hb result at any point*
- *The red cells were administered. The patient suffered no ill effects from this avoidable transfusion*

Multiple mislabelled samples result in prolonged use of group O D-negative units

- *A woman in her 20s was admitted to the emergency department following major trauma and issued an emergency trauma identity*
- *The sample and request form did not match on the first set of two crossmatch blood samples received - Unknown Unknown on the sample, but a patient's name on request form*
- *The second set of two samples both had unknown spelt incorrectly - Uknown on the sample*
- *A third set of two blood samples was received 2 hours later*
- *One did not have a date of birth and was rejected*
- *Group-specific blood components could only be made available after the seventh sample was received, resulting in prolonged use of emergency O D-negative blood*

Transfusion authorised for the wrong patient

- *A junior doctor was singlehanded on an unfamiliar ward with no consultant support*
- *Two patients had the same first name*
- *The doctor assessed Patient 1 and made the clinical decision that a red cell transfusion was required*
- *He then contacted the hospital transfusion laboratory and ordered red cells using the hospital number for Patient 2 and then prescribed on Patient 2's chart*
- *The red cell unit was collected, and administration commenced*
- *The doctor then realised the error and immediately stopped transfusion*
- *Stressed from workload, the doctor did not communicate clearly with nursing staff who may have identified the error if they were aware of the planned transfusion*

Avoidable transfusion to a Jehovah Witness

- *A man in his 80s was transfused following surgery for fractured neck of femur despite an advance directive specifying no transfusions*
- *The decision was made to transfuse a stable patient based on a haemoglobin of 79g/L (the patient had a minor cardiac history) by an on-call team who did not know the patient*
- *The patient also had a plan documented the day before that he was not for transfusion*

Under or Overtransfusion

Overtransfusion during major haemorrhage

- *An elderly woman had an estimated gastrointestinal blood loss of about 500mL and was peri-arrest*
- *A major haemorrhage call was made; she received six units of red cells and two of fresh frozen plasma*
- *Her haemoglobin (Hb) post transfusion was 179g/L*
- *There was no pre-transfusion Hb, and it was not assessed during the treatment*

Undertransfusion caused by a bleed back into red cell bag associated with peri-arrest in a man with gastrointestinal bleeding

- *A man in his 60s was admitted with haematemesis and melaena and a haemoglobin of 54g/L*
- *The first unit of red cells was transfused but the bag was disconnected from the pump and put on the bed while he had an urgent computed tomography scan at night and then needed to use the urine bottle*
- *While the nurse was fetching the second unit, about 500mL bled back into the first bag; the patient complained of chest pain and a feeling of doom*
- *An arrest call was put out; he received further transfusion and recovered*

Excessive transfusion for folate deficiency

- *A woman in her 70s and a low body weight of 29kg was admitted with symptoms of anaemia and a haemoglobin (Hb) of 61g/L*
- *She received two units of red cells*
- *On the following day she was reviewed by another consultant and was transfused a further two units*
- *The post-transfusion Hb was 155g/L*
- *Her anaemia was due to severe folate deficiency*

Incidents Related to Prothrombin Complex Concentrates (PCC)

Failure to administer prothrombin complex concentrate (PCC) to an elderly man with intracranial haemorrhage

- *A request was made from the emergency department (ED) to the transfusion laboratory to issue PCC 1000IU to reverse warfarin for a patient with an acute subdural haematoma resulting from a fall*
- *PCC was issued at 00:58 but never collected*
- *At 12:25 the PCC was returned to stock by the transfusion laboratory*
- *A verbal handover in the ED stated that the patient had received the PCC and was also documented wrongly in the patient notes*
- *Failure to give PCC was considered contributory to his death*

Failure to give prothrombin complex concentrate (PCC) for intracranial haemorrhage (ICH) due to misunderstanding of a new information technology system

- *An elderly man on edoxaban for atrial fibrillation presented to the emergency department (ED) with a history of a fall at home*
- *He sustained another fall in a cubicle in the ED hitting his head*
- *A computed tomography scan of his brain demonstrated ICH*
- *PCC was prescribed on the new electronic patient record system (which had only been in use for a month) at 17:56 however the request was not automatically received in the laboratory*
- *PCC was not issued until nearly 4 hours later at 21:39 when the laboratory was contacted by telephone*
- *This delay was considered contributory to the patient's death*

Life-threatening delay in administration of prothrombin complex concentrate (PCC) for gastrointestinal haemorrhage

- *A woman in her 50s on warfarin (metallic heart valves) presented to the emergency department with melaena and a haemoglobin of 48g/L*
- *PCC was authorised by the on-call haematologist at 06:30 but not requested until much later, at 17:55*
- *The patient was topped up with red cells but failed to receive PCC as the international normalised ratio (INR) result was delayed (coagulation analyser recorded INR as >10 but was recorded on laboratory information management system as 'unable to analyse' in error)*
- *She developed haemodynamic instability requiring transfer to intensive care unit for inotropic support*
- *Endoscopy was eventually done at 02:00*

Incomplete dose of prothrombin complex concentrate (PCC) given without prescription for a patient with intracranial haemorrhage (ICH)

- *A dose of 3000IU PCC was advised by the consultant haematologist for a patient with ICH; this correct dose was issued from the transfusion laboratory*
- *At 21:58 the nursing notes documented that 3000IU had been given, but only 2000IU was given and not correctly recorded by an agency nurse working in a busy emergency department (ED)*
- *The patient was admitted to the intensive care unit and made a full recovery*
- *A vial of 1000IU PCC was returned to laboratory from ED 12 days after issue*

Delayed prothrombin complex concentrate (PCC) administration for intracranial haemorrhage (ICH)

- *A man in his 70s on anticoagulants for atrial fibrillation and with left sided weakness arrived in the emergency department (ED) at 02:01*
- *At 07:15 it was noted that the patient had a long wait in ED*
- *A computed tomography scan showed ICH*
- *At 10:40 the haematology registrar advised PCC which was issued, but not administered until 2 hours later, 11 hours after admission*
- *There were delays in the prescribing, ordering, collection, and administration of the drug due to lack of knowledge (new nurse and agency nurse looking after the patient)*

Delay in adequate reversal of anticoagulation following pelvic fracture

- *An elderly lady fell sustaining a fracture of her pelvis*
- *She was on warfarin for atrial fibrillation and was admitted at 05:55*
- *Scanning suggested active bleeding and at 08:21 the major haemorrhage protocol was activated; a haematology registrar advised an inappropriately low dose of prothrombin complex concentrate (PCC) (15IU/kg)*
- *A corrected dose of 50IU/kg was given 3 hours later*
- *Death was not thought related to the suboptimal first PCC dose*

Delay in treatment of intracranial haemorrhage due to prothrombin complex concentrate (PCC) request made for wrong patient

- *PCC was ordered using the wrong patient's demographics and resulted in a delay of 3 hours before PCC was requested for the correct patient*
- *The wrong case notes were selected by a doctor who was unfamiliar with the ward*
- *The correct case notes were in the X-ray department where the patient had been for a scan*

Delayed administration of prothrombin complex concentrate (PCC) in a man with intracranial haemorrhage (ICH)

- *An elderly man admitted the previous evening with a raised international normalised ratio and had ICH identified on a computed tomography scan*
- *A decision was made to reverse warfarin at 09:00, and a request sent at 09:25*
- *The PCC was issued, and porters contacted at 09:40, collected at 11:07, and given at 12:10, more than 12 hours from admission*
- *The emergency department was very busy and poorly staffed*
- *The patient died 16 days later unrelated to the delay*

Inappropriate and delayed administration of prothrombin complex concentrate (PCC)

- *An elderly woman on apixaban experienced a small rectal bleed*
- *PCC was requested at 20:35 but not collected until 03:30*
- *It was then given over 9 hours instead of 40 minutes*
- *This treatment was not necessary as well as being delayed*
- *There was a lack of knowledge about PCC in medical and nursing staff*

Underdose of prothrombin complex concentrate (PCC) treatment due to lack of adequate stock

- *A man in his 60s was admitted to the emergency department with new right sided weakness*
- *He had atrial fibrillation and was anticoagulated with apixaban*
- *A computed tomography scan demonstrated intracranial haemorrhage*
- *Haematology staff recommended 2000IU of PCC from the transfusion laboratory in accordance with the organisations guideline for treating major haemorrhage in patients taking direct acting oral anticoagulants*
- *However, only 500IU of PCC were available with another 1000IU transferred from a linked hospital, so the patient ultimately received a total of 1500IU*

Delayed and underdosing of prothrombin complex concentrate (PCC) for intracranial haemorrhage treatment due to lack of adequate stock

- *An elderly woman with suspected subarachnoid haemorrhage was recommended to receive 3000IU PCC to reverse anticoagulation at 17:06*
- *This was collected from the transfusion laboratory at 17:45, but administration of 1500IU was not finished until 05:00 the next day*
- *There was no documentation of the start time*
- *The full dose was not given*
- *The remaining three vials were not found until a week later*
- *Staff infrequently used PCC, and did not appear fully aware of its indications and the requirement to be given promptly*

Delay in treatment of intracranial haemorrhage (ICH)

- *An elderly woman with ICH had a 2-hour delay in prothrombin complex concentrate administration due to poor communication*
- *It was not clear if this would have changed the outcome*
- *She deteriorated and died*

Near Miss
Wrong Blood in Tube (WBIT)

Multiple errors resulted in a wrong blood in tube (WBIT)

- *A nurse asked the phlebotomist to take a group and screen sample from the 'patient in bed 2'*
- *The intended patient had been moved to another bed and no positive patient identification was carried out before or after taking the sample*
- *The phlebotomist then handed the blood sample to the nurse to label*
- *This was done away from the patient's bedside using the request form*

Incorrect group detected by cell-free fetal deoxyribonucleic acid (cffDNA) prediction

- *Baby group and Kleihauer samples were received in the transfusion laboratory*
- *The baby sample grouped as O D-negative, same group recorded as maternal blood*
- *The cffDNA test predicted baby as D-positive*
- *Further testing confirmed the baby group was O D-positive*

Neonate not adequately identified by two doctors

- *During an induction week, Doctor 1 was paired with Doctor 2, who took a blood sample from a one-day old baby*
- *Doctor 1 filled out the request form to help and did not do this at the bedside and incorrectly wrote the details out from the wrong patient's notes*
- *Doctor 1 did not check with Doctor 2 before sending the request*

Two samples are safer than one

- *A neonate was transferred from another hospital for cardiac surgery*
- *A sample grouped as O D-positive, and one unit of red cells was issued*
- *The local agreement for neonatal cardiac surgery allows issue of red cell units with one sample*
- *A second sample received in the afternoon grouped as O D-negative*
- *Then staff checked with the referring hospital (which should have ideally happened when first sample was received)*
- *The patient's group recorded there was O D-negative*

Patient wrongly identified in an emergency at home

- *Paramedics were called to a patient in cardiac arrest at home*
- *A paramedic registered the patient as somebody with a similar name and these details were used by hospital staff to print the patient identity band and label blood samples*
- *The patient deteriorated and died in the intensive care unit, and a death certificate was completed for an incorrect patient*
- *The general practitioner was informed of his patient's death and realised the patient was still alive and there had been an incorrect identification of the patient*
- *He requested the episode of care be removed from his patient's records*
- *Transfusion group and screen result was removed as part of this process*

Right Blood Right Patient (RBRP)

No patient identifiers on the blood prescription form

- *A female in her 70s was receiving a unit of red cells prior to revision of her hip*
- *Red cells were administered with staff checking the patient details on the drug chart rather than the blood prescription*
- *The right component was transfused, and the error was only identified when the transfusion practitioners were carrying out a periodic spot check audit*
- *The staff reflected on the incident and noted that the shift was a busy stressful shift and substantive staff were having to take on extra tasks that agency staff were unable to do*

Blood components administered in the wrong order

- *A female in her 80s was prescribed platelets and red cells (in that order) following treatment for myeloma*
- *The healthcare assistant was asked by the medical staff to collect the blood component/s without the right authorisation sheet*
- *The prescription chart had also not been completed and the red cells were transfused first after checking patient identification details*
- *When the paperwork was completed, the nurse noted that the doctor had prescribed platelets to be administered first followed by red cells*
- *All the necessary blood components were transfused with no adverse impact*

Laboratory Errors

Missed anti-D Ig administration following delivery due to multiple errors with inconclusive cell-free fetal deoxyribonucleic acid (cffDNA) result

- *A D-negative woman in her 30s had an emergency caesarean section*
- *The cffDNA result was inconclusive, so cord and maternal samples were sent for testing*
- *The cord sample was found to be positive but no anti-D Ig was issued*
- *The biomedical scientist (BMS) assumed this had been done immediately following delivery as with pregnancies that are predicted D-positive*
- *The ward was not contacted to inform them that anti-D Ig was needed and a Kleihauer test was also not performed*
- *The clinical staff did not check whether anti-D Ig was required, the woman was discharged without having anti-D Ig administration and had to return for this >72 hours after giving birth*
- *The reporter noted that staffing levels directly impacted the correct procedures being followed*
- *The laboratory had implemented contingency plans for staffing and non-registered staff were the only staff present for 4 and a half hours earlier in the day, causing a large backlog of work*
- *This sample was also processed whilst two other major haemorrhages required support by a single member of BMS staff*

Major morbidity due to a component selection error for a female of childbearing potential

- *A female in her 30s was found to have an anti-K as part of antenatal screening*
- *She had required two units of red cells post-delivery in a previous pregnancy due to active bleeding*
- *One of these units issued by the biomedical scientist (BMS) was K-positive*
- *The laboratory information management system had an alert for all females less than 50 years to state 'Females of childbearing potential should receive K-negative red blood cells unless they are unavailable in an emergency', but this did not prevent the issue of K-positive red cells to this patient despite the availability of K-negative units*
- *The investigation stated there was a lack of knowledge in recently qualified BMS staff about K-negative requirements, and that continued recruitment and retention issues had placed a training burden on the remaining staff*
- *Additionally, there were leadership issues due to changes to restructuring*

Good practice by laboratory staff triggers lifesaving treatment of baby

- *A biomedical scientist (BMS) identified a mixed field result within a group and screen sample for a pregnant patient*
- *This prompted the BMS to contact the clinical area to request an additional sample and highlight the risk of large fetomaternal haemorrhage*
- *The patient was brought back into hospital for cardiotocography, the results of which were suspicious and resulted in early delivery of the baby*
- *The baby was very anaemic and required red cell transfusion*
- *If this had not been noted by the BMS and escalated, the mother may not have been reassessed and the baby not successfully delivered*
- *A 'Greatix' report was raised within the organisation to acknowledge the prompt action of the BMS who has also received acknowledgment throughout the pathology network*

Errors Related to Information Technology (IT)

Remote electronic issue on samples with an edited group

- *During correspondence with the laboratory information management system (LIMS) provider, it was mentioned that another site had found a problem with the LIMS/blood-tracking interface which meant samples where the group had been manually edited were still available for remote electronic issue*
- *The information technology search identified three samples which had a 'result manually edited' flag but remote electronic issue was still enabled, and blood had been collected for transfusion*

Multiple errors and misuse of the electronic blood management system

- *Emergency group O red cells assigned to a specific patient were collected from the laboratory by emergency department staff without a pick-up slip as it was an emergency*
- *The laboratory received an alert to say that there was an incompatibility between the patient identity (ID) band and the blood component*
- *The transfusion was stopped immediately, and the component was returned part-transfused*
- *The staff member who administered the transfusion came to the laboratory with two patients' ID bands in their hand stating they had scanned the wrong one and that it was not attached to the patient at the time*
- *Furthermore, the person who started the transfusion was not the same person whose ID badge was used in that process*
- *The ID band printers were not working in the emergency department, so staff had to go elsewhere to get ID bands printed and multiple wristbands were held in nurse's pockets*

Equipment and communication failure leading to delay in collection

- *A patient required a blood transfusion for intraoperative bleeding*
- *The electronic blood management system handheld device in theatre was not responding or working after several attempts*
- *Maternity's handheld device was missing*
- *The intensive care unit's handheld device would not print a barcode for use on the collection slip*
- *The clinical team tried to bleep the laboratory several times, but there was no answer*
- *The bleep number was confirmed with the switch board but again no answer*
- *Two colleagues went to pathology and banged on the door until someone answered to gain access to the blood refrigerator for this patient's blood which was needed urgently*

Someone else's access card used to get emergency blood

- *The transfusion laboratory rejected two pre-transfusion samples, so theatre needed to use emergency blood from the remote blood refrigerator*
- *The theatre nurse did not have access to Haemobank because their personal barcode was not working*
- *The hospital transfusion laboratory advised them to seek another staff member with access*
- *This was misinterpreted as being told to use someone else's barcode*
- *O D-negative red cells were removed, and the component transfused in theatre*

New laboratory information management system (LIMS)

- *The department went live with a new LIMS which included a new label printer*
- *As the labels printed, they came out successively, with the first printed label on the bottom when they are removed from the printer*
- *The biomedical scientist was unfamiliar with the new design of the labels and, although they checked the patient details, they omitted the bag number check and transposed the bag labels, which were both for the same patient*
- *Immediate action was taken to ask all staff to only print one label at a time and complete that labelling before printing labels for further units*
- *Additionally, quotes were sourced for software which could mandate a 'bag and tag' scan prior to release to prevent such an incident re-occurring*

Wrong platelets transfused despite multiple alerts

- *Platelet components were issued to two patients on the same ward with exactly the same surname, and very similar hospital numbers*
- *The nurse collecting received an audible alert on the blood-tracking system stating, 'stop contact blood bank for advice' and the screen stated that the unit was assigned to a different patient and to return the component to storage*
- *The nurse sought advice from the laboratory and was told to continue with collection*
- *The patient developed a fever and returning the platelets to the agitator resulted in another alert that the platelets were 'already in storage'*
- *The system therefore 'quarantined' the unit*
- *Later, on scanning the platelet component out a second time the blood-tracking system gave an audible alert 'stop contact blood bank for advice and the screen stated that the unit was 'unsuitable for use'*
- *The biomedical scientist again advised to continue with collection*
- *The two-person independent pre-administration check did not prevent transfusion to the wrong patient*

Failure to use a legacy system to look for red cell antibodies

- *Two units of red cells were provided by electronic issue, but legacy system checks were omitted*
- *The patient met all electronic issue criteria according to testing on current laboratory information management system which had been in place since August 2021*
- *The historical anti-K and anti-C were recorded on the legacy system but were not discovered until 'end of testing' form check was performed*
- *These checks should be performed daily because data migration from the legacy system may have been planned but had not yet taken place*
- *There were ongoing staffing capacity issues that could have contributed to the incident*

Unit expiry not noticed because the electronic blood management system (EBMS) was down

- *A nurse checked on EBMS as to whether the unit of red cells was ready for collection several times in the afternoon and evening - but they could not see that the blood component was available*
- *When it was finally noted to be available, they assumed it had only just been issued*
- *The unit was not issued using the electronic system as EBMS was offline, so it was signed out manually and the time of expiry was not noticed*
- *The unit had expired 5 hours before the transfusion started*

Electronic blood management system (EBMS) not used in an emergency transfusion

- *The major haemorrhage protocol (MHP) was activated and a unit of B D-positive red cells allocated to a patient on a different ward was collected from the issue blood refrigerator*
- *It was taken to the ward where the MHP was in progress and transfused to an O D-negative patient*
- *EBMS, which should have been used, was not used and would have prevented this error*
- *The medical staff made the assumption that this was emergency O D-negative blood and did not require a bedside check*
- *The patient died and death was possibly related to the transfusion (imputability 1)*

Failure to update or replace equipment

- *Transfusion was completed for a red cell component 6 hours and 31 minutes after leaving temperature-controlled storage*
- *The organisation had an electronic blood management system in place but due to information technology issues the handheld devices were no longer reliable so were not being used*
- *No begin time was recorded on the paperwork*
- *Patient was transferred to a different clinical area 6 hours after the unit was started and the unit was immediately taken down by the receiving area*
- *The end time was documented on the paperwork 30 minutes after the patient arrived in the clinical area*

Access denied

- *A patient post-solid organ transplant required group O red cells to ensure compatibility with both patient and organ donor to reduce the risk of passenger lymphocyte syndrome*
- *This was flagged on the clinical notepad within the laboratory information management system*
- *The biomedical scientist (BMS) was using a workstation logged in by support staff who had different access rights to view patient's transfusion requirements*
- *As a result, the patient's own group (group A) was provided*
- *The support worker had not logged off the computer so when the BMS answered the phone at the workstation to look up the patient they did not appreciate they were on someone else's login*
- *According to information provided, support workers should have had access to view the clinical notepad*

Forgotten access information

- *Clinical staff unable to access blood refrigerators for emergency O D-negative red cell units*
- *Staff who were trained to collect blood components could not remember their personal pin numbers to access the blood refrigerator resulting in a delay in transfusion*

Sample validity changed by laboratory information management system (LIMS) upgrade

- *Following a LIMS upgrade, staff reported that the sample validity was incorrect*
- *A patient sample that should have had a 72-hour sample validity was still at 5 days*
- *A lookback at all patients transfused since migration was undertaken and three patients had been transfused on expired samples*
- *This was an issue noted with a previous upgrade and therefore was included in the validation script and it passed*
- *But investigation showed that the 'hot fixes' were not on the checklist of application fixes required for the terminal servers, they were loaded one application package at a time and one of the servers had been missed*
- *There is now a second check on the server installations where hot fixes are required to ensure all are deployed as expected*
- *Process have been modified where all servers have all 'hot fixes' deployed as standard*

Unable to delete flags from laboratory information management system (LIMS)

- *A fetus was predicted D-negative and so mother and did not require anti-D immunoglobulin (Ig), however anti-D Ig was ordered and administered*
- *The cell-free fetal deoxyribonucleic acid (cffDNA) referral report was entered onto LIMS and clinical flag added to patient file, as per protocol*
- *The cffDNA results were not clearly documented on the maternity electronic record, although were available on the main electronic patient record*
- *The mother attended antenatal assessment unit with a bleed and received anti-D Ig*
- *The doctor did not see the cffDNA results and prescribed anti-D Ig which was then given to the mother*
- *This request should not have been made, as the cffDNA result was on the system and would have been visible to the midwife if the process had been completed correctly*

Febrile, Allergic and Hypotensive Reactions (FAHR)

Misclassification of a febrile reaction results in inappropriate immediate and future management

- *A child with aplastic anaemia receiving a platelet transfusion developed a fever of 39.2°C with rigors, hypertension and tachycardia*
- *There were no allergic features*
- *He was given an antihistamine and hydrocortisone and a plan was made for prophylactic chlorphenamine before future platelet transfusions*

Unnecessary investigations for an allergic reaction

- *A male in his 30s with thalassaemia, who had a history of allergic reactions in other settings, developed rash, urticaria, facial swelling and mild hypotension after 60mL of his third unit of red cells had been transfused*
- *Transfusion was discontinued, he was given an antihistamine and hydrocortisone and his symptoms settled*
- *He was investigated with IgA levels, mast cell tryptase, repeat group and screen, direct antiglobulin test and blood cultures, none of which showed any abnormality*

Transfusion-Associated Circulatory Overload (TACO)

Severe chronic iron deficiency anaemia in a patient with low body weight

- *A female patient in her 80s with a low body weight (49kg) was asymptomatic and haemodynamically stable with severe microcytic hypochromic anaemia (haemoglobin (Hb)44g/L) with no clinical signs of pulmonary oedema on the chest X-ray or clinical examination*
- *Three units of red cells were transfused over a period of 15 hours because the attending doctor was aiming for a post-transfusion Hb of 70-90g/L*
- *The patient developed respiratory compromise (desaturation from 100% on room air to 71%, with dyspnoea, wheeze, and tachypnoea)*
- *There were new cardiovascular changes: tachycardia (heart rate 131bpm) and hypertension (blood pressure 204/96mmHg)*
- *Fluid balance was not clearly documented*
- *Additional fluid was not involved. A diuretic was given but the patient deteriorated and died, therefore a diuretic response could not be evaluated*
- *There was clear evidence of overtransfusion as the post-transfusion Hb was 111g/L*
- *The patient did not otherwise have comorbidities predisposing circulatory overload*
- *The post-transfusion chest X-ray showed pulmonary oedema*

Pulmonary Complications of Transfusion: (Non-TACO)

Major haemorrhage in a patient with multiple comorbidities, meeting transfusion-related acute lung injury (TRALI) criteria

- *A male patient in his 50s with decompensated liver disease, renal failure, ascites, COVID-19 and right lower lobe of the lung pneumonia was transfused 13 red cell units, 12 fresh frozen plasma, 4 cryoprecipitate, and 2 platelets following a puncture of the inferior epigastric artery during ascites drainage*
- *There was sudden development of 'very high ventilation requirements' with 'Acute respiratory distress syndrome like picture' on chest X-ray*
- *He was mechanically ventilated for 18 days but died as result of respiratory compromise*

Suspected fluid overload in an outpatient transfusion

- *A female patient in her 50s with multiple sclerosis attended for an outpatient red cell transfusion*
- *The reason for the haemoglobin of 68g/L was not recorded*
- *During the second unit of red cells, she developed severe respiratory distress, with systolic blood pressure 196mmHg, flushing, wheeze and crepitations*
- *There was no improvement with diuretics and adrenaline*
- *Care was not escalated because of a pre-existing resuscitation order*
- *The case was reported as transfusion-associated circulatory overload (TACO), with 'death directly and solely caused by transfusion'*

Rapid transfusion of patient with megaloblastic anaemia

- *A female in her 30s was admitted with megaloblastic anaemia and a haemoglobin of 31g/L, undetectable folate levels and low B12 levels*
- *She was transfused three units of red cells, the second unit over 20 minutes*
- *Desaturation was noted during the second unit and the transfusion was stopped during the third unit*
- *The chest X-ray showed features of fluid overload, but the case did not meet transfusion-associated circulatory overload (TACO) criteria*
- *The patient was admitted to the intensive care unit but made a full recovery*

Reaction to granulocytes fulfilling transfusion-related acute lung injury (TRALI) criteria

- *A male patient in his 40s with neutropenic sepsis and acute lymphoblastic leukaemia developed acute breathlessness, fever, and hypoxia 6 hours after a granulocyte transfusion*
- *Diffuse bilateral shadowing was reported on chest X-ray*
- *The patient made a full recovery with increased oxygen provision only*

Antibody-positive case at high risk for transfusion-associated circulatory overload (TACO)

- *A male recipient in his 60s with a left ventricular assist device, renal impairment and low albumin experienced dyspnoea, wheeze, hypoxia, and an increase in temperature approximately 1 hour into transfusion of red cells for anaemia due to gastrointestinal bleeding*
- *He had also received 1L crystalloids and had a 1.2L positive fluid balance*
- *The chest X-ray showed bilateral pulmonary congestion and there was no initial improvement with diuretic*
- *He was transferred to intensive care unit and received continuous positive airway pressure and a furosemide infusion*
- *He had improved after 6 hours and was transferred back to the ward the following day*
- *Human leucocyte antigen class I and II antibodies were found in a female donor*

Antibody-positive case which does not fit transfusion-related acute lung injury (TRALI) criteria

- *A female in her 60s who was post allogeneic transplant attended for an outpatient red cell transfusion*
- *She had recently been started on antibiotics by her general practitioner and was slightly breathless prior to transfusion*
- *She became hypoxic during transfusion, developed atrial fibrillation and had a small troponin rise*
- *There was an improvement within 2 hours following administration of diuretics, and she needed non-invasive ventilation*
- *The chest computed tomography scan showed peribronchial ground glass shadowing in keeping with bronchopneumonia*
- *Subsequent investigations showed she was positive for influenza A*
- *A female red cell donor was positive for human leucocyte antigen A2 and B27 which matched the recipient*

Haemolytic Transfusion Reactions (HTR)

Diagnosis of delayed haemolytic transfusion reaction delayed due to supply of incorrect transfusion history

- *A patient presented at the emergency department feeling unwell and experiencing thigh pain and pyrexia*
- *The patient reported receiving a recent transfusion but when the previous hospital was contacted, they stated that the patient had only received plasma products*
- *Laboratory results were suggestive of haemolysis with a high bilirubin, raised lactate dehydrogenase, positive direct antiglobulin test and haemoglobinuria*
- *An anti-E antibody was detected in the group and screen sample*
- *The patient's Hb dropped to 60g/L overnight*
- *The transfusion practitioner at the previous hospital later confirmed that the patient had received four units of red cells in her last transfusion episode at the hospital of which at least one was confirmed as positive for the E antigen*

Clinical notes stated patient history not available on a haemoglobinopathy patient

- *Anti-S was detected in an initial sample and three units of S-negative red cells were issued by indirect antiglobulin test (IAT) crossmatch*
- *The patient was being monitored as having a high risk for hyperhaemolysis when classical symptoms indicative of a delayed haemolytic transfusion reaction were reported, including a falling Hb, high bilirubin, raised lactate dehydrogenase, positive direct antiglobulin test (DAT) and haemoglobinuria*
- *The post-transfusion sample was DAT-positive and anti-Jk^b plus another possible IAT-reactive antibody were detected in addition to the anti-S*
- *Samples were referred to the reference laboratory who confirmed they had previously investigated this patient in 2015 when they confirmed the presence of anti-Jk^b*
- *This result was available on Specialist Services electronic reporting using Sunquest's Integrated Clinical Environment (Sp-ICE)*
- *Investigation into the reaction by the hospital found that the patient had a clinical note on record stating that the ward had attempted to obtain the patients previous history, but this had not been available*

Uncommon Complications of Transfusion (UCT)

A sick patient with multiorgan dysfunction deteriorated following a red cell transfusion

- *A male patient in his mid-30s with pituitary hypogonadism, decompensated alcoholic liver disease and COVID-19 was receiving a red cell transfusion when he became tachycardic, tachypnoeic with increased work of breathing and increasing oxygen requirement*
- *Arterial blood gases showed a deranged metabolic state*
- *The transfusion was stopped, with increased ventilatory and vasopressor support*
- *The laboratory investigation of the transfusion reaction showed no discrepancies or incompatibility, and the donor unit was tested and found to be suitable for transfusion*
- *The pre- and post-transfusion group and screen samples had negative antibody screens, but had a 1+ IgG reaction on the direct antiglobulin test*
- *No serological evidence of a transfusion reaction was noted by the laboratory*
- *The patient had initially stabilised after stopping the transfusion but later died of multiorgan failure*

Hypertension during red cell transfusion

- *A female patient in her early 60s with adenocarcinoma of the lung became hypertensive during a two-unit red cell transfusion as a day case*
- *Observations taken pre transfusion were within normal range and the transfusion-associated circulatory overload (TACO) risk assessment did not reveal any risk factors*
- *The highest blood pressure record noted was 200/103mmHg*
- *The patient continued to feel well with no pulmonary symptoms, and the rest of the observations remained in range*
- *Furosemide was administered as prescribed, and the patient was admitted to the ward for overnight monitoring*
- *The patient recovered uneventfully*
- *It was noted that the pre-transfusion haemoglobin was 92g/L raising the question of the need for transfusion support in this patient and an avoidable complication/admission*

Respiratory distress and desaturation following transfusion in a patient with underlying COVID-19, suspect sepsis and multiple health issues

- *A male patient in his 70s with a past history of adenocarcinoma prostrate treated with radical radiotherapy post 15 years, chronic myelomonocytic leukaemia diagnosed in 2021, history of abdominal tuberculosis was admitted with sepsis and COVID-19 and a history of haematuria*
- *He was partaking in study AML 1001 and was due to start treatment but developed temperature and noted to have crepitations on left base*
- *He was started on intravenous tazobactam/piperacillin and received pooled platelets but desaturated after the transfusion with oxygen requirement- received chlorpheniramine and hydrocortisone and escalation of antibiotic cover to meropenem was considered*
- *This was initially thought to be allergic/pulmonary complication post transfusion*
- *The patient stabilised with the above measures and was planned for steroids and antihistamines with future transfusions*
- *No details available regarding fluid balance and additional investigations*

Transient hypertension, and tachycardia during and post transfusion in a sick patient with multiple co-morbidities

- *A female patient in her early 80s was admitted with sepsis secondary to acute cholangitis, obstructive common bile duct stone, Ileus, metabolic acidosis had a slight rise in temperature (0.5 degrees), tachycardia and rise in blood pressure (BP) records an hour after commencing a crossmatched red cell transfusion on the intensive care unit*
- *The patient's vital signs pre-transfusion were BP 135/60mmhg, temp: 36.9'C, pulse: 110 beats/min, resp: 22/min and vital signs during transfusion reaction were: BP 180/80mmHg, temp: 37.4'C, pulse: 125 beats/min, resp:22*
- *The blood pressure remained high during the night then settled down in the morning at 10:00 and the BP was 125/50mmHg*
- *The patient recovered fully and was reported to have other co-morbidities including type 2 diabetes mellitus, hypertension, chronic kidney disease and cholecystitis*

Transient spike in blood pressure (BP) with non-specific symptoms during/post transfusion

- *A female patient in her early 60s with endometrial carcinoma was admitted with symptomatic anaemia*
- *After transfusion of 11mL of red cells reported full body rigors, pain at cannula site (? infiltration), restlessness, nausea, and anxiety*
- *Patient observations also indicated a spike in the BP with no pyrexia, tachycardia, breathing difficulty or rashes reported*
- *Decision was made to discontinue transfusion and the patient reported feeling well, was offered paracetamol for the pain but declined*
- *Observed for 2 hours with no adverse outcome and the patient was safely discharged reporting feeling well*

Chest pain, backache, and other non-specific symptoms during transfusion

- *A female patient in her 80s with cold haemagglutinin disease and transfused regularly (every 4 weeks) was seen in the haematology day unit with a haemoglobin of 87g/L, and two units of red cells were prescribed*
- *She developed chest pain and backache then onset of confusion was reported shortly after commencement of the second unit*
- *She was reviewed by the consultant haematologist who concluded that this was not a typical reaction but concluded that the patient was overtransfused*
- *The patient has had previous reactions so gets very anxious and reported epigastric pain, slight rise in blood pressure*
- *The patient received intravenous furosemide, observed, and recovered uneventfully*
- *Retrospectively the team agreed that the second unit was unnecessary*

Retching, loin pain, tachycardia and shortness of breath during transfusion

- *A female in her 70s with carcinoma ovary complained of loin pain, developed shortness of breath, became tachycardic, flushed and started retching 10 minutes into a unit of red cells*
- *The patient received antihistamine, steroids and the transfusion was discontinued, and she recovered fully*

Lumbar pain, sweating and flushing immediately after start of transfusion

- *A male patient in his mid-60s with acute myeloid leukaemia and sepsis received a unit of platelets developed lumbar pain, sweating, and flushing almost immediately after start of transfusion*
- *Vitals were stable and direct Coomb's test remained negative post transfusion*
- *Transfusion was discontinued and the patient was treated with hydrocortisone and had been on chlorpheniramine*
- *The patient recovered completely*

Abdominal pain during transfusion

- *A young child developed abdominal pain part way through a transfusion and was subdued and quiet*
- *No other symptoms reported, and no abnormal neurology noted on examination*
- *The pain had resolved by itself following defaecation and 30 minutes after the end of the transfusion the child was back to normal*
- *The team decided to give both chlorpheniramine and hydrocortisone prior to subsequent transfusions*

Generalised agonising pains and hypotension during transfusion

- *A male patient in his 60s with type 2 diabetes, liver fibrosis, renal impairment, kidney stones, previous renal cancer and radical nephrectomy was admitted with melaena, and red cell transfusion was commenced*
- *Within 2 minutes of the start of transfusion, the patient reported intense pain at venflon site and transfusion was stopped and recommenced through other venflon in his left antecubital fossa*
- *Approximately 1 minute later patient became very distressed with agonising pain all over*
- *Blood was immediately stopped; patient was noted to have a drop in blood pressure (93/73 from 119/57) with tachycardia and patient reported feeling like he could die*
- *The patient was given paracetamol, repeat antibody screen was negative and the patient recovered fully following these measures*

Chest tightness and dyspnoea following pooled platelets

- *Chest tightness and dyspnoea was reported on two separate occasions in a male patient in his late 50s with acute myeloid leukaemia immediately following the commencement of a pooled platelets transfusion*
- *Electrocardiogram repeatedly was normal*
- *Transfusion was stopped transiently but was recommenced following medical review and completely uneventfully*
- *No risk factors noted on transfusion-associated circulatory overload risk assessment*
- *While the patient had some dyspnoea, tachycardia with a slight rise in blood pressure, no desaturation was noted, and this was not investigated further*
- *It was unclear as to whether pre-medications were given prior to transfusion but patient did receive intravenous hydrocortisone following a repeat reaction and has been planned for washed platelets in the future following discussions with the transfusion team*

A preterm neonate with Enterobacter sepsis

- *This case involved a preterm neonate born prematurely at 26^{+5} weeks gestation, who was a twin, and had an acute deterioration on day 16/17 of life*
- *This was noted to be following a red cell transfusion over 3.5 hours prior to the deterioration*
- *Despite escalation of intensive care: high frequency oscillatory ventilation, inotropes, transfusion support and antibiotics, the neonate continued to deteriorate and died*
- *Enterobacter was identified on blood cultures sample and the transfused blood was also checked and showed no growth of any pathogens*
- *Enterobacter sepsis and prematurity were identified as a cause of death on the death certificate*
- *Transfusion pre-deterioration was deemed to be coincidental rather than causative*
- *This was originally reported as a possible case of transfusion-associated necrotising enterocolitis, but there was no clinical or radiological evidence for this*

Transfusion-Transmitted Infections (TTI)

Near miss bacterial transfusion-transmitted infection (TTI) (*Staphylococcus aureus*)

- *An apheresis platelet pack was returned to the Blood Service before being transfused, following the observation of clumps within the pack by the hospital transfusion laboratory*
- *On return, small white flakes could be seen in the pack. Routine bacterial screening was reported as negative*
- *BacT/ALERT bottles were also returned for further culture and investigation*
- *Samples from the pack itself were positive for Staphylococcus aureus in both anaerobic and aerobic bottles on two occasions*
- *S. aureus was also isolated from a swab from the implicated donor*
- *Molecular typing confirmed the donor and pack isolates were a single strain*
- *The donor was informed and removed from the donor panel*

Confirmed hepatitis B virus (HBV) transmission from a donor with occult HBV infection - recipient 1

- *Recipient 1 (50-60 years) had progressive kidney disease*
- *They were diagnosed with an acute asymptomatic HBV infection in early 2022, four months post transfusion*
- *HBV testing was performed following a liver function screen which revealed an increased alanine transaminase*
- *Blood transfusion was considered the most likely source of infection*
- *They had received 28 units of fresh frozen plasma over 2 months in 2021*
- *Six of the 28 donors were non-returning donors and their implicated donations all tested negative for anti-HBc and HBV deoxyribonucleic acid (DNA)*
- *Of the returning donors, 21 of 22 tested negative for anti-HBc, and one donor tested positive with HBV DNA detected in their implicated donation on retesting by individual donation nucleic acid testing (NAT)*
- *Post-donation testing had returned negative by pooled NAT*

Confirmed hepatitis B virus (HBV) transmission from a donor with occult HBV infection - recipient 2

- *Subsequent lookback investigations into red cell components made from the donation in Case 20.2 identified a second HBV infected recipient*
- *Recipient 2 (70-80 years) had severe fibrosis due to non-alcoholic fatty liver disease*
- *Nine months post transfusion, the recipient was tested and found to be positive for HBsAg, HBeAg and anti-HBc*
- *HBV deoxyribonucleic acid (DNA) was also detected at a very high level*
- *They had tested negative for HBsAg in May 2017, and no other source or risk factors for HBV were identified*
- *Following their positive test, the patient was started on antiviral treatment*
- *Sequencing analysis showed high similarity between the virus obtained from the implicated donor and the two recipients, and confirmed transfusion as the source*

Post-Transfusion Purpura (PTP)

Post-transfusion purpura (PTP)

- *A female patient in her 70s with cholangiocarcinoma was transfused two units of red cells as an outpatient prior to a liver biopsy*
- *Seven days later she developed bruising and was found to have a platelet count of 8*
- *There were no features of sepsis, and no history of medication exposure, even transiently*
- *She had further transfusions of red cells and platelets which produced poor increments*
- *Platelet count gradually increased and had returned to normal 10 days after presentation*
- *Intravenous immunoglobulin treatment was not given*
- *Platelet antibodies were not detected either at presentation or on a repeat sample 6 weeks later*
- *Tests revealed her platelet phenotype as human platelet antigen (HPA) 5b5b and had potential to form anti-HPA 5a*
- *In view of the possible diagnosis of PTP, transfusion was avoided, with erythropoietin used to support her haemoglobin*
- *No further transfusion support was needed before she died of her malignancy 6 months later*

Cell Salvage (CS)

Failure to communicate risks inadequate anti-D immunoglobulin (Ig) prophylaxis

- *A woman in her 20s underwent an elective caesarean section in which cell salvage was to be used*
- *Prior to surgery there was no discussion within the theatre team about the women's blood group, which was D-negative*
- *The patient received a transfusion of 251mL of salvaged red cells whilst in theatre, something not communicated to the midwife at handover*
- *This was later discovered when the patient herself told the midwife she had received her own blood back and the fact verified by review of the anaesthetic chart*
- *No maternal sample had been taken for Kleihauer testing even though over 45 minutes had elapsed since the transfusion*
- *A review of the cell-free fetal deoxyribonucleic acid (cffDNA) result however showed that the baby was also D-negative meaning that no anti-D Ig prophylaxis was required*

Paediatric Cases

Preterm baby received an adult platelet component

- *A preterm baby who had sepsis and low platelets required an emergency platelet transfusion*
- *An adult platelet component was incorrectly collected from the transfusion laboratory*
- *The neonatal intensive care unit team noted that the unit was much larger than usual and did not have the standard compatibility label*
- *As it was the same blood group as the patient it was decided to transfuse to the baby*
- *Part way through the transfusion the laboratory rang to inform the ward team of the error*
- *Of note the unit was not cytomegalovirus-negative*

Failure to provide irradiated blood component for a potentially immunodeficient infant with DiGeorge syndrome

- *Clinicians failed to communicate the diagnosis of DiGeorge syndrome to the laboratory for a child who was a few months of age, and they did not receive irradiated red cells*
- *Of note the transfusion was urgent due to haematemesis*
- *The child had not previously been known to the hospital and no assessment of immune function was recorded*

Management of abnormal results following exchange transfusion

- *A term neonate received an exchange transfusion for hyperbilirubinemia*
- *Following the procedure, the fibrinogen was found to have dropped to 0.8g/L*
- *The neonate was given cryoprecipitate but was well with no bleeding and with no invasive procedure planned*

Failure to activate the major haemorrhage protocol (MHP)

- *A teenage patient was admitted with major bleeding*
- *There was a delay in provision of fresh frozen plasma due to the switchboard team activating two trauma calls rather than activating the MHP call*
- *This meant that a porter was not sent to collect the blood components*

Management of iron deficiency

- *A teenager presented with symptomatic iron deficiency anaemia with a haemoglobin of 65g/L*
- *There was a delay in obtaining red cells due to problems with sample labelling, which resulted in the need for repeat samples and failure to request the red cells*
- *This caused many hours of delay before the first unit was commenced*

Delay to provision of platelets

- *There was a delay in provision of platelets to a child with an acute lymphoblastic leukaemia*
- *This delay was due to communication issues around when the unit was required*
- *The prescriber had specified that apheresis platelets should be provided*

Delay in provision of red cells for a child with sickle cell disease (SCD) due to incorrect exchange unit ordered

- *A young child with SCD required a red cell exchange*
- *A neonatal exchange unit was erroneously requested for the child*
- *This resulted in a delay in provision of the red cells*

Error with infusion line clamps resulted in overtransfusion following cell salvage

- *During transfer from theatres to the paediatric intensive care unit the clamps on the infusion line were left open which resulted in an overtransfusion and at too high a rate*
- *The child required venesection/dilutional exchange to reduce the haemoglobin from 173g/L to 148g/L over the next 12 hours*

Overtransfusion due to prescription of incorrect volume

- *One unit of red cells was prescribed for a child with neuroblastoma*
- *The increased volume compared to usual was noticed by the parent*
- *The reporter commented that a full red cell unit had been prescribed rather than 15mL/kg*
- *The child had received 290mL (25mL/kg)*

Infusion pump programming error in a neonate

- *A preterm baby received red cell transfusion at only 1.4mL/hour instead of 5mL/hour for the first 2.5 hours of a transfusion*
- *The member of staff had not followed the unit policy of having a second check for pump programming*

Transfusion-associated circulatory overload (TACO) following transfusion for severe anaemia in a neonate

- *A term neonate was born with a haemoglobin of 44g/L secondary to severe fetomaternal haemorrhage*
- *The neonate received an initial 18mL (5mL/kg) red cell transfusion via 'slow bolus' followed by 18mL/hr for 3 hours*
- *Between 2-6 hours following transfusion the neonate developed increasing respiratory distress requiring intubation and ventilation*
- *Furosemide was given with improvement in clinical status*

Abdominal pain during transfusion

- *A young child developed abdominal pain part way through a transfusion and was subdued and lethargic*
- *No other symptoms were reported, and the pain had settled following defaecation and 30 minutes after the end of the transfusion the child was back to normal*
- *The team decided to give both chlorpheniramine and hydrocortisone prior to subsequent transfusions*

Haemoglobin Disorders

Hyperhaemolysis treated with eculizumab

- *A man in his 20s with sickle cell disease presented with widespread pain and was generally unwell*
- *This was following an admission at another hospital where he was treated for a sickle cell crisis and COVID-19 infection and received several red cell transfusions*
- *Blood tests demonstrated haemolysis with a haemoglobin nadir of 36g/L*
- *There was an associated fall in reticulocyte count and raised ferritin of >15000ng/mL*
- *Antibody screen and direct antiglobulin test were negative*
- *He was treated for hyperhaemolysis with steroid, intravenous immunoglobulin and eculizumab*

Hyperhaemolysis following elective transfusion for surgery preparation

- *A middle-aged man with sickle cell disease underwent an elective red cell exchange transfusion in preparation for hip surgery*
- *Due to a history of previous delayed haemolytic transfusion reaction, he received steroids and intravenous immunoglobulin (IVIg) prior to transfusion*
- *Despite prophylactic measures, he developed further haemolysis and was treated with steroid, IVIg and eculizumab*
- *No new antibody was reported*

Haemolytic transfusion reaction following transfusion not matched for extended Rh group

- *A middle-aged female with sickle cell disease presented with flu-like symptoms and a haemoglobin of 55g/L*
- *A decision was made for top-up red cell transfusion*
- *The red cell unit selected was not matched for extended Rh phenotype and the patient received C-positive units*
- *The patient developed acute intravascular haemolysis and required intensive care admission*
- *Limitations of information technology with incomplete details in the transfusion request combined with potential gaps in staff knowledge contributed to this error*

Post haemopoietic stem cell transplant (HSCT) thalassaemia patient experienced allergic reaction to platelet transfusion

- *A male patient in his 20s with thalassaemia was admitted to the haematology ward post HSCT and experiencing haematuria*
- *The patient developed bronchospasm and urticaria 15 minutes into a transfusion of irradiated platelets*
- *The transfusion was immediately stopped, and the patient was given antihistamines and hydrocortisone*
- *His symptoms subsided within a few hours, and he fully recovered*

A sickle cell disease (SCD) patient with known antibodies presented at a new hospital

- *A teenage male with SCD and multiple red cell antibodies including anti-U and anti-f presented to a different hospital to which he normally attended, and a decision was made for transfusion*
- *The laboratory failed to register a diagnosis of SCD from the request form*
- *The haematology team also failed to provide the laboratory with a transfusion history*
- *No antibodies were detected in the local laboratory and therefore the patient did not receive the specific requirements for red cell transfusion*
- *There were no reported immediate clinical consequences*

Wrong blood component given to a patient with thalassaemia

- *A man in his 20s with thalassaemia attended for routine transfusion*
- *Whilst the first red cell unit was being transfused it was realised that the blood component being administered was intended for another patient on the unit*
- *The patient was group A and received group O blood*
- *The patient also had a history of red cell alloimmunisation and therefore was at risk of developing subsequent antibodies*
- *No clinical consequences were reported*

Delay in top-up transfusion in sickle cell disease (SCD) resulted in clinical deterioration and the need for red cell exchange

- *A patient in his 20s with SCD was admitted with fever and chest pain*
- *A diagnosis of acute chest syndrome was made and a plan for two units of red cells*
- *The medical on call team later reviewed the patient due to ongoing hypoxia and discussed with the on call haematologist*
- *The following morning the patient had become more unwell at which point it became apparent that the patient had not yet received the transfusion as planned from the previous day*
- *Due to a deterioration in his condition an urgent red cell exchange was arranged*

Pre-administration transfusion checks prevented a wrong component transfused

- *Two patients with the same first name and a diagnosis of thalassaemia were sat next to each other in the day unit awaiting routine transfusion*
- *A unit of red cells was taken from the refrigerator for one of the patients and during the pre-administration check, it was realised it was for the other patient and was therefore returned to the refrigerator*

Haemolytic transfusion reaction following transfusion abroad

- *A teenager with sickle cell disease presented to a hospital for the first time unwell with symptoms including fever, vomiting, jaundice, and dark urine*
- *There was evidence of haemolysis with a haemoglobin of 50g/L and a positive antibody screen*
- *The patient was new to the UK and had recently received a transfusion abroad prior to travelling*

Laboratory not informed that transfusion was for a patient with sickle cell disease (SCD)

- *A female in her 50s with SCD presented with abdominal pain and was generally unwell*
- *The medical team requested three units of red cells but did not inform the laboratory that the patient had SCD*
- *It was not clear if the haematology team were consulted from the report*
- *The patient received blood which was not Rh- and Kell-matched and was not HbS-negative*

Specific requirements not met in a patient with sickle cell disease (SCD) on multiple occasions

- *A man in his 20s with SCD received a blood transfusion*
- *The laboratory team noticed after the blood had been given that the request form stated a diagnosis of SCD*
- *On looking back at the transfusion record it was apparent that the laboratory had issued blood for this patient on at least two prior occasions without knowledge of his diagnosis and therefore specific requirements were not given for each episode*

System flag in place but blood components that did not meet the specific requirements given

- *An adult female with non-transfusion dependent thalassaemia required a one-off transfusion*
- *The laboratory had a flag on the system for specific requirements but incorrectly administered c-positive units*
- *No subsequent antibody was identified*

ABO-incompatible transfusion in sickle cell disease (SCD) resulting in major morbidity

- *A man in his 40s with SCD attended for elective red cell exchange*
- *He was inadvertently given the wrong red cell unit intended for another patient*
- *The SCD patient was group O and received group B red cells*
- *The patient developed loin pain, rigors and hypotension and was admitted for close observation*
- *The patient improved and recovered with supportive measures*

Delay in top-up transfusion in sickle cell disease (SCD) resulting in clinical deterioration and need for red cell exchange

- *A young female with SCD was reviewed and a plan made for two units of red cells; it was handed over to the nursing team to transfuse as soon as the units became available*
- *The following morning the patient had deteriorated at which point it became apparent the red cells had not been given*
- *Due to the clinical deterioration an urgent red cell exchange was arranged*
- *The nursing staff reported that it was unclear if the transfusion was to be given*

Delay in top-up transfusion in sickle cell disease (SCD) resulting in clinical deterioration and need for red cell exchange

- *A patient in her 20s with SCD was diagnosed with acute chest syndrome and a plan made for three units of red cells*
- *The nursing team did not give the transfusions overnight due to pyrexia*
- *Overnight there was a deterioration in the patient resulting in the need for emergency red cell exchange*

Transfusion Errors in Transplant Cases

Incorrect ABO group transfused after incorrect advice

- *A shared-care patient received a haemopoietic stem cell transplant at hospital 1*
- *A letter confirming the transplant was uploaded to the clinical computer system at hospital 2*
- *Blood components were requested for the patient post transplant approximately 3 weeks later and on two separate occasions*
- *In both instances the request form stated, 'post transplant' and the biomedical scientist (BMS) on duty sought advice from the supervisory BMS regarding component selection*
- *The supervisory BMS did not investigate the type of transplant the patient had received and gave the incorrect advice to the BMS*
- *The patient received blood components which was the same group as his pre-transplant group (B D-positive)*
- *They should have received group O D-positive blood components*

Specific requirements not met due to poor communication between hospitals

- *A unit of non-irradiated red cells was issued to a patient who required irradiated components*
- *The error was detected when the clinical area returned the second unit, after noticing that it was not irradiated*
- *The patient had two hospital numbers*
- *The requirement for irradiated components was added to record 1, at which time there was only one hospital number*
- *The laboratory received the first sample with the number for record 2*
- *There was no mention of the irradiated requirement on the request form*
- *The biomedical scientist failed to check for duplicate hospital numbers in deviation from local policy*
- *The clinical area failed to notice that the requirements were not met prior to transfusion of the first unit*

Failure by the clinical team to complete the specific requirements form

- *An email communication was received regarding a patient due for stem cell harvesting*
- *The consultant noted the email but saw that transfusion management staff also were included in email and, due to workload did not complete the specific requirements request form*
- *The consultant recorded in the medical records that the patient was planned for stem cell harvest but failed to record the requirement for irradiated cells*
- *The patient subsequently required a red cell transfusion, which was prescribed by the FY1 covering the medical wards, who was not on a haematology rotation*
- *Non-irradiated red cells were provided by the laboratory and transfused to the patient*

Immune Anti-D in Pregnancy

Misinterpretation of the maternal blood group resulted in omission of anti-D immunoglobulin (Ig)

- *A primiparous woman in her 20s booked in at 8 weeks*
- *The maternal blood group was misinterpreted as D-positive*
- *No routine antenatal anti-D Ig prophylaxis was given at 28 weeks, and there were no potentially sensitising events reported*
- *Peripartum maternal anti-D was detected*
- *A review of the maternal blood group report confirmed a D variant*

Immune or prophylactic anti-D 28-week sample

- *A primiparous woman in her early 30s was booked in at 9 weeks*
- *The group and antibody screen detected the mother to be D-negative, and no alloantibodies were detected*
- *The maternal sample for cell-free fetal deoxyribonucleic acid at 16 weeks predicted the fetus to be D-positive*
- *No potentially sensitising events were reported*
- *The maternal blood sample at 28 weeks was taken prior to routine antenatal anti-D Ig prophylaxis administration which detected anti-D and was misinterpreted as prophylactic anti-D Ig*
- *After a live birth at 40 weeks; the maternal antibody panel was 4+ anti-D, cord direct antiglobulin test 3+, maternal anti-D quantification was 156.7IU/mL*
- *The neonate required phototherapy*

Route of administration

- *A D-negative primiparous woman in her 20s of average weight, received 1500IU intramuscular gluteal routine antenatal anti-D Ig prophylaxis at 28 weeks gestation based on the cell-free fetal deoxyribonucleic acid test which predicted the fetus to be D-positive*
- *There were no potentially sensitising events reported*
- *Following delivery at 40 weeks a maternal blood sample detected anti-D, with a quantification of 27.7IU/mL*

Large fetomaternal haemorrhage

- *A D-negative woman in her late 20s, was booked in at 11 weeks*
- *Her weight was 79kg, and she was gravida 2 para 1. Immune anti-D was detected at booking, and a D-negative baby was born at 36 weeks*
- *In the previous pregnancy routine antenatal anti-D Ig prophylaxis was administered and from the details provided it appears that a suboptimal dose was given post delivery*
- *Further details are provided here. Following an elective caesarean section at 39^{+1} a significant fetomaternal haemorrhage (FMH) of 63.1mL was recorded*
- *If the anti-D Ig was administered intramuscularly the anti-D Ig dose required was calculated to be 8000IU (63.1x125=7887.5)*
- *Advice was provided that the dose required if the anti-D Ig was given intravenously (IV) was equivalent to 50% of the intramuscular dose*
- *The calculation of anti-D Ig to be given IV should have been 100IU per mL (6310IU)*
- *This suggests the dose provided of 4500IU was not adequate*
- *A Kleihauer at 72 hours reported a FMH of less than 4mL, no further anti-D Ig was provided and no further Kleihauer was performed*

Prophylactic or immune anti-D, antenatal monitoring

- *A woman in her 20s, gravida 4 para 1 (2 miscarriages) booked at 8 weeks, with a booking weight of 66.5kg*
- *Booking bloods did not detect any anti-D*
- *A group and antibody screen at 28 weeks detected anti-D and the report noted probable prophylactic anti-D Ig and requested a further sample*
- *A repeat sample was not sent*
- *Routine antenatal anti-D Ig prophylaxis was provided at 28 weeks*
- *At 35 weeks following a fall, prophylactic anti-D Ig was administered, however no Kleihauer was performed*
- *A group and antibody screen detected alloimmune anti-D, quantification 5.2IU/mL*
- *Following a scan at 36^{+6} weeks a decision was made to bring the planned elective caesarean section forward to 38 weeks*
- *The prior live birth was a caesarean section*
- *The mother delivered a D-positive baby, haemoglobin (Hb)130g/L, direct antiglobulin test 4+*
- *The baby was monitored and re-admitted with evidence of ongoing haemolysis; Hb68g/L and the baby required red cell transfusion*

Sensitisation in what appears to be ideal management

- *A D-negative woman, gravida 2 para 1 in her 30s was booked in at 9 weeks, booking bloods did not detect anti-D, booking weight 78.8kg*
- *Maternal cell-free fetal deoxyribonucleic acid at 16 weeks predicted the baby to be D-positive*
- *The mother attended at 27 weeks following per vaginal bleeding, a group and antibody screen was taken and the women was provided with 500IU anti-D Ig*
- *The Kleihauer was negative however alloimmune anti-D, quantification 9.5IU/mL was detected*
- *The highest level recorded in the pregnancy was 35.2IU/mL at 35 weeks*
- *In the prior pregnancy the woman booked in at 9 weeks, received routine antenatal anti-D Ig prophylaxis, no sensitising events had been identified, and the baby was born by vaginal delivery at 40^{+4} days*
- *The previous baby was D-positive, postpartum anti-D Ig was provided and the Kleihauer was less than 2mL*
- *The mother and baby were monitored by the fetal maternal unit in the index pregnancy, the pregnancy resulted in a live birth at 37^{+3}*
- *The baby was D-positive and received phototherapy*

Routine antenatal anti-D Ig prophylaxis (RAADP) implementation and local policy

- *A D-negative primiparous woman in her 20s was booked in at 10 weeks*
- *No RAADP was administered*
- *No potentially sensitising events (PSE) were recorded*
- *Alloimmune anti-D was detected on admission prior to delivery, quantification 1.9IU/mL; routine antenatal samples did not detect any red cell atypical antibodies*
- *The woman delivered a D-positive infant at 39^{+4}*
- *The department had a policy to administer anti-D Ig following a PSE, but no policy regarding RAADP*